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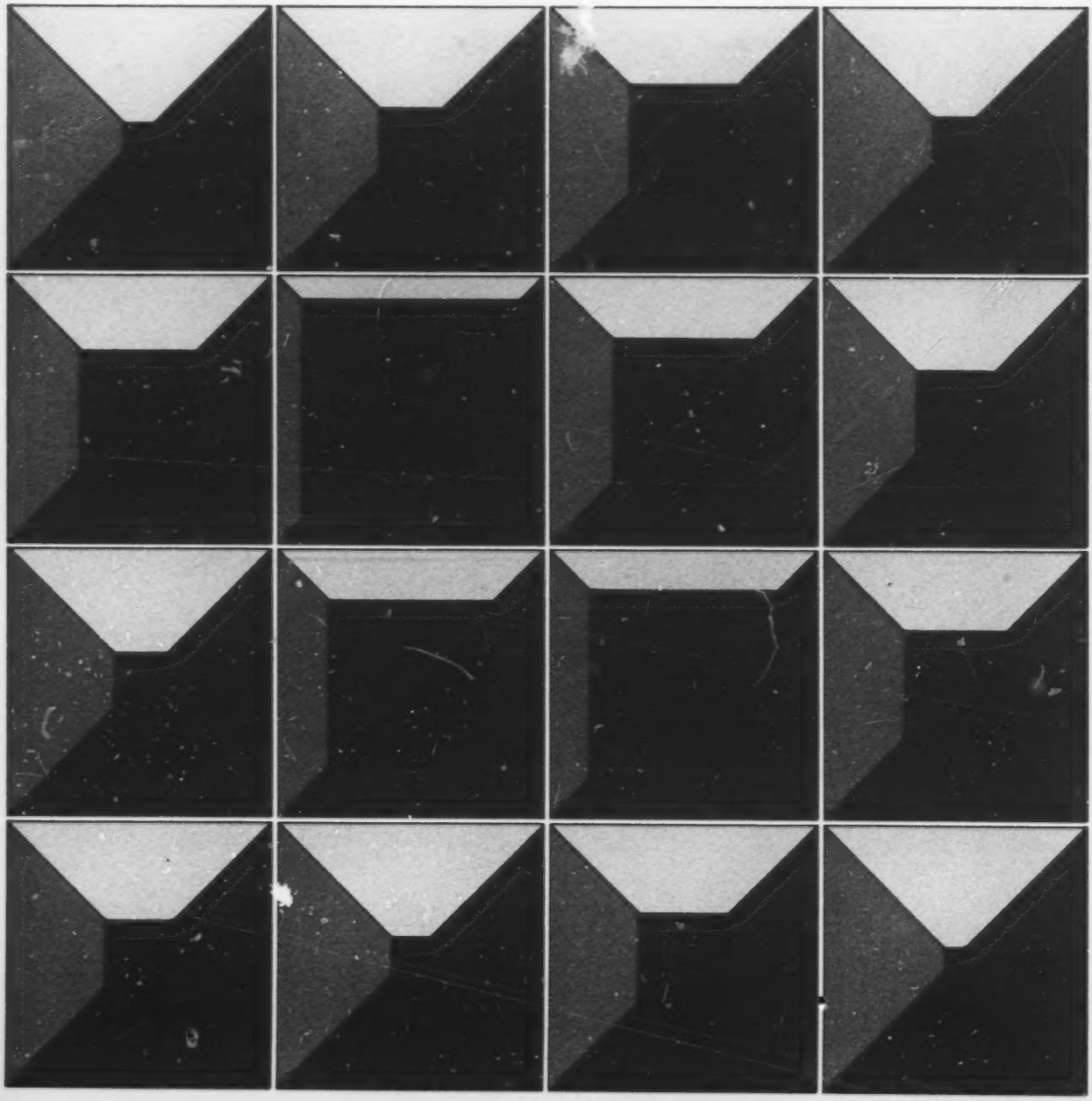
Natural Gas Pricing Policies: Implications for the Federal Budget

Congress of the United States
Congressional Budget Office



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NATURAL GAS PRICING POLICIES: IMPLICATIONS FOR THE FEDERAL BUDGET

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NOTE

Unless otherwise noted, all dollar figures in this report are expressed in nominal (current dollar) terms and thus include the assumed effects of inflation.

PREFACE

A wellhead pricing policy for natural gas is an important element of U.S. energy policy. In order to raise the wellhead prices of natural gas to achieve a balance between supply and demand in 1985, the Natural Gas Policy Act of 1978 specified gradual price increases for various categories of gas, based on a projected price of oil that is considerably lower than current oil prices. This price disparity has introduced more inefficiency in the natural gas market and could, depending on oil prices and contract provisions, lead to a sharp increase in average wellhead prices in 1985. Consequently, alternative natural gas pricing policies have been suggested to facilitate the transition to a deregulated market.

At the request of the Senate Budget Committee, this paper analyzes the macroeconomic and budgetary effects of alternative natural gas wellhead pricing policies. In keeping with CBO's mandate to provide objective analysis, the report makes no recommendations.

This paper was written by Timothy Considine of CBO's Natural Resources and Commerce Division, under the supervision of David L. Bodde and Everett M. Ehrlich. Research assistance was provided by Kristi Bleyer, Emily Fox, Paul Higgins, and Timothy McBride. The author wishes to thank Robert Dennis, Frederick Ribe, Peter Taylor, and Stephen Zeller of CBO's Fiscal Analysis Division; Kathleen Gramp, Anne Hoffman, and Kathy Ruffing of CBO's Budget Analysis Division; and Valerie Amerkhail and James Nason of CBO's Tax Analysis Division for their helpful comments. Patricia H. Johnston edited the manuscript, and Deborah L. Dove typed the many drafts.

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January 1983

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SUMMARY

In the Natural Gas Policy Act (NGPA) of 1978, the Congress sought to decontrol gradually the wellhead price of most natural gas, thereby providing incentives for a more efficient gas industry. But events that were not envisioned by the framers of the NGPA--the 1979-1980 oil price shock and contract provisions peculiar to the gas industry--have disrupted the smooth transition to decontrol contemplated in the NGPA. These conditions have led many in the Congress to reconsider the nation's long-term pricing policy for natural gas.

While the decontrol of natural gas is a major issue in formulating U.S. energy policy, this report examines natural gas pricing policies from the perspective of the federal budget. The higher gas prices resulting from decontrol would have significant macroeconomic repercussions. In turn, these economic responses would ultimately change budgetary outlays and, especially, revenues.

This report discusses three approaches to wellhead price decontrol, including complete decontrol on January 1, 1984. Assuming moderate increases in the price of oil between 1982 and 1985 and an accommodative set of fiscal and monetary policies, the resulting budgetary effects would be small under any alternative, both in comparison with the federal deficit and in comparison with the other policy instruments that affect the budget. The complete decontrol of all natural gas on January 1, 1984, for example, would reduce the fiscal year 1984 federal deficit by $3.4 billion when compared to the budget with the NGPA assumed to remain in force. The cumulative effect over fiscal years 1984-1987 would be a $5.0 billion reduction in the deficit.

If oil prices rose to a higher level, the fiscal year 1984 deficit would be reduced by $7.0 billion under complete decontrol. Under a low oil price scenario, complete decontrol would reduce the deficit by only $1.4 billion. Under complete decontrol, a nonaccommodative monetary policy combined with a fiscal policy that restricted federal discretionary spending would reduce the deficit by $4.6 billion in fiscal year 1984. These restrictive policy assumptions magnify the output losses under decontrol and lead to a $1.8 billion increase in the 1985 deficit.

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NATURAL GAS POLICY, THE ECONOMY, AND THE FEDERAL BUDGET

Changes in natural gas pricing policy would set in motion economic events that pull the federal deficit in opposite directions. Higher natural gas prices would result immediately in increased corporate taxes from the gas industry and higher royalty payments from gas produced on federal lands. But macroeconomic adjustments to higher prices might offset these revenue gains. To the extent that the adjustment to higher gas prices resulted in a temporary reduction in economic growth and employment, taxes paid elsewhere in the economy could decline, and expenditures for federal transfer payment programs would increase. If gas decontrol raised the rate of inflation, expenditures on indexed payment programs (such as Social Security) would also rise. Expenditures for discretionary programs would either have to be increased or a lower real level of services accepted.

In the long run, natural gas decontrol could result in economic gains, as a less-constrained gas market allowed firms and consumers to use energy more efficiently. But in the short term, the economy would undergo a period of dislocation, adjustment, and reduced economic growth as higher gas prices led to significant changes throughout the economy. Consumers would reduce their consumption of nonenergy goods as higher gas prices eroded their purchasing power. Firms would adjust their production by substituting other fuels for higher priced gas or adjusting their utilization of capital or employment of workers. These adjustments would eventually generate the economic benefits associated with decontrol, but they would take time since prices and wages do not respond rapidly to changed circumstances.

The budgetary effects of alternative natural gas pricing policies would depend strongly on how these changes would affect the economy. Unfortunately, most current macroeconomic models are not designed to represent the effects of such policy alternatives. They do not deal explicitly with the central factors linking natural gas policy with the economy--how consumers reduce their consumption of nonenergy goods and how firms substitute other fuels and factors of production for natural gas when its price rises. It is essential to understand the duration and strength of these adjustments and their interim impact on employment and prices.

This report addresses these issues using an economic model especially designed to deal with these effects.[1] The model generally produces results that are within the range of other large macroeconomic models, but has the

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1. This analysis is described in Congressional Budget Office, An Empirical Analysis of Energy-Economy Interactions (forthcoming).

advantage of specifically representing the effects of higher energy prices, gas prices in particular. The intent of this analysis is not to predict the future but rather to suggest the magnitude and the direction of the economic and budgetary effects resulting from alternative natural gas policies.

The Policy Options and Assumptions

Three gas pricing policy options are examined in this report:

- Complete decontrol of all wellhead natural gas prices on January 1, 1984;
- Advancing the partial decontrol found in the NGPA by one year, to January 1, 1984; and
- Administrative decontrol in which prices for some older categories of gas would be raised to the higher levels allowed for new gas on January 1, 1983.

The budgetary effects of these options are presented in terms of changes from the CBO budget baseline, which includes NGPA. [2]

Two sets of assumptions are central to estimating the budgetary effects of natural gas price decontrol. The first concerns oil prices, which play a large part in determining how high decontrolled gas prices would rise--first, because oil is the primary fuel with which gas competes and, second, because many gas contracts directly and indirectly tie the price of decontrolled gas to the price of oil. Oil prices are assumed to rise from $34.00 per barrel in 1983 to about $39.00 per barrel in 1985 in nominal dollars.

The second set of assumptions involves the conduct of fiscal and monetary policies during the period of adjustment following decontrol. Discretionary federal spending is assumed to increase in response to inflation, so that it remains constant in real terms. Monetary policy is assumed to be accommodative, in that the money supply is allowed to expand to finance the higher natural gas prices that decontrol would bring. The effects of different assumptions about oil prices and fiscal and monetary policies are also examined.

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2. Congressional Budget Office, Economic and Budget Outlook: An Update (September 1982).

The level of natural gas prices under NGPA and the three policy options would depend on oil prices and contract provisions between producers and purchasers not commonly found in other markets. The contract provisions are important since they will largely determine the amount of gas that would reach oil prices. The average wellhead natural gas price would be a weighted average of gas that is priced at or near oil prices and gas with prices below oil prices. Under NGPA, average wellhead natural gas prices will increase 23 percent in 1985 from their 1984 levels to $3.83 per thousand cubic feet. If complete decontrol was adopted on January 1, 1984, then gas prices would increase 49 percent in that year to $4.10 per thousand cubic feet. A partial decontrol of gas prices in 1984 would increase wellhead prices about 25 percent. Finally, administrative decontrol in 1983 would cause a 19.1 percent increase in average wellhead prices from their 1982 levels contrasted with a 14.1 percent increase under NGPA.

MACROECONOMIC AND BUDGETARY EFFECTS

Effects under the Base Assumptions

A comparison of the macroeconomic and budgetary effects of the three policy options under the base assumptions is presented in the Summary Table. Complete decontrol of wellhead gas prices on January 1, 1984, would lower gross domestic product by 0.3 percent in that year, raise inflation by 1.1 percent, and reduce the fiscal year 1984 budget deficit by $3.6 billion. [3] Federal revenues and royalties would rise by $6.9 billion in fiscal year 1984, about half of which would come from higher personal income tax receipts as inflation pushed taxpayers into higher tax brackets (bracket creep). These higher revenues, however, would be somewhat offset by increased federal expenditures of $3.3 billion, of which about $0.9 billion resulted from higher benefit payments made to individuals. Beyond 1985 inflation would subside and output increase and the net effect would be a slight reduction in the federal deficit over the levels that would have occurred under NGPA. These small reductions reflect increases in benefit payments to individuals and the indexing of the personal income tax in 1985, which will eliminate the bracket creep additions to individual income tax revenues. Thus, over fiscal

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3. Gross domestic product (GDP) is a national income concept based on production within the geographic borders of a country. Gross national product (GNP) covers production by and incomes to citizens of a country no matter where they live. GDP is used in this report because changes in gas prices would not appreciably affect income earned from foreign sources.

SUMMARY TABLE. A COMPARISON OF THE MACROECONOMIC AND BUDGETARY EFFECTS OF THREE NATURAL GAS POLICY OPTIONS; CHANGES FROM THE NGPA BASE CASE (By calendar year)

Variable	1983	1984	1985	1986	1987
Real Gross Domestic Product (GDP) (percent change)					
Complete decontrol	0.00	-0.30	0.01	0.04	0.03
Partial decontrol	0.00	-0.10	0.05	0.03	0.00
Administrative decontrol	-0.05	-0.03	0.03	0.02	0.00
GDP Deflator (rate of change)					
Complete decontrol	0.00	1.10	-0.40	0.00	0.00
Partial decontrol	0.00	0.40	-0.30	0.00	0.00
Administrative decontrol	0.20	0.00	-0.20	0.00	0.00
Net Budgetary Effect (by fiscal year, in billions of dollars) [a]					
Complete decontrol	0.00	3.60	0.70	0.20	0.50
Partial decontrol	0.00	1.10	-0.50	-0.50	-0.30
Administrative decontrol	0.40	0.30	-0.50	-0.40	-0.20
Nominal Wellhead Natural Gas Prices (percent change)					
Complete decontrol	0.00	31.80	14.40	14.40	14.40
Partial decontrol	0.00	10.30	0.00	0.00	0.00
Administrative decontrol	4.40	4.20	0.00	0.00	0.00

a. Positive numbers indicate a reduction in the deficit; negative numbers indicate an increase.

years 1984 to 1987, the cumulative reduction in the federal deficit resulting from complete decontrol is only $5.0 billion.

Since the average gas price increase would be smaller under partial decontrol, its revenue-generating effects would be reduced, but so would the macroeconomic adjustment costs in terms of inflation and lost output. Partial decontrol on January 1, 1984 would reduce the fiscal year 1984 budget deficit by $1.1 billion. Federal revenues and royalties would rise by

$2.2 billion, of which half would come from higher personal income taxes. These revenues would be offset by $1.1 billion in higher federal expenditures, of which one-third would come from nondiscretionary and two-thirds from discretionary spending programs. Beyond 1984, the pattern would reverse itself, and the net budgetary effect would be an increase in the deficit, unlike the decrease under the complete decontrol option which would raise more revenues. For fiscal years 1984 through 1987, the cumulative net budget effect would be insignificant, however--a deficit increase of $0.2 billion.

Administrative decontrol would cause the least economic dislocation of the three policy options, and, therefore, would have the smallest budgetary impact. Administrative decontrol on January 1, 1983, would reduce the fiscal year 1984 budget deficit by $0.3 billion.

Effects Under Different Oil Price Assumptions

The effects described above depend on the assumption that oil prices will rise to about $39.00 in nominal dollars in 1985. To examine the sensitivity of these results to this assumption, two alternative oil price paths were assumed. A low oil price path assumes that prices will drop to $28.00 per barrel by 1985, and an alternative high price path projects oil prices of $44.00 per barrel in that year (all figures in 1985 dollars).

Different oil price assumptions not only change the budgetary effects of gas decontrol when measured from the CBO baseline; they also change the baseline itself. Assuming the NGPA remained in force, the high oil price path would reduce the fiscal year 1984 deficit by $3.3 billion, primarily because of higher personal and gas industry taxes.

When measured against this higher NGPA base case, complete decontrol of gas on January 1, 1984, would result in a $7.0 billion reduction in the 1984 deficit. Again, the pattern of this increase would include higher personal income taxes, social insurance taxes, and taxes paid by the gas industry, with offsetting outlays from higher expenditures on nondiscretionary and discretionary spending. The net cumulative budgetary effect would be smaller over fiscal years 1985-1987, as scheduled indexing in 1985 restricted increases in personal taxes and nondiscretionary benefit payments increased. Most of the revenue effects of decontrol would have been realized anyway under the NGPA's 1985 partial deregulation. Using the higher oil price assumption, partial deregulation would lower the fiscal year 1984 deficit by $2.8 billion.

The lower oil price path would increase the NGPA base case budget deficit, since lower oil prices would reduce the windfall profits tax and

personal income tax receipts caused by bracket creep. Assuming the NGPA remained in force, the lower oil price path would add $10.0 billion to the fiscal year 1984 deficit. Compared to the low oil NGPA base, complete decontrol in 1984 would reduce the fiscal year 1984 deficit by $1.4 billion and the outyear deficits only moderately. The cumulative change in the budget deficit for fiscal years 1984-1987 would be $2.0 billion. Partial decontrol under the low oil price path would reduce the fiscal year 1984 federal deficit by $0.4 billion and would lead to a cumulative reduction in the federal deficit of $0.5 billion for fiscal years 1984-1987.

Effects Under Different Monetary and Fiscal Policy Assumptions

Assumptions regarding the conduct of fiscal and monetary policies during the adjustment to decontrolled gas prices are also pivotal. In response to higher gas prices, consumers and firms could increase their demands for money to finance transactions. If the Federal Reserve Bank did not allow the supply of money to expand to accommodate these demands, interest rates would rise. Thus, a nonaccommodative monetary policy would result in slower growth and more unemployment, but less inflation than the accommodative monetary policy first assumed in this analysis.

Moreover, the initial estimates assumed that discretionary federal spending would be increased to account for any added inflation resulting from gas decontrol. With current and projected large deficits, such an assumption may be unrealistic. An alternative assumption, therefore, is that discretionary spending would not increase to reflect higher rates of inflation. These two alternative policy assumptions--the erosion of discretionary spending and a nonaccommodative monetary policy--were combined to form an alternative set of policy assumptions under which the budgetary effects of decontrol could be examined.

Using these more restrictive assumptions, complete decontrol of natural gas prices on January 1, 1984, would lead to a reduction in the federal deficit of $4.6 billion in fiscal year 1984. In addition, the output losses under complete decontrol would be larger and more prolonged than those found under base case assumptions. This greater reduction in economic growth would lead to larger increases in nondiscretionary federal spending, greater reductions in taxes paid outside the energy sector, and an increase in the deficit in 1985. The cumulative effect, however, would be a $7.7 billion reduction in the deficit over the fiscal year 1984-1987 period. This reduction would be greater than the net budgetary effect under the base case assumptions because of restricted discretionary spending. Under these alternative policy assumptions, partial decontrol would reduce the federal budget deficit a mere $1.4 billion in fiscal year 1984. Over fiscal years 1984-1987, the net cumulative deficit reduction would be $3.7 billion.

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CONCLUSION

Natural gas decontrol would generate new tax revenues from the gas-producing industry, but these revenue increases would be offset by higher levels of federal spending caused by higher inflation and unemployment. As a result, the effect of decontrol on the deficit, even under a range of different oil price and monetary and fiscal policy assumptions, would be small compared to projected budget deficits. Thus, in the absence of any special taxes on new profits accruing to the gas industry, the decontrol of natural gas prices at the wellhead would not appreciably change the federal budget deficit.

CHAPTER I. INTRODUCTION

Some portion of the natural gas market has been regulated since 1938. Over the years, additional regulation and the growth of a body of transactions and contract provisions peculiar to this market produced a growing imbalance between supply and demand. 1 This imbalance was especially acute in the interstate gas market in which lower, controlled prices created shortages during the mid-1970s. 2

In response to these conditions, the Congress passed the Natural Gas Policy Act (NGPA) of 1978 to provide incentives for new production through higher prices while limiting prices for gas already in production. In order to raise the wellhead prices of natural gas to achieve a balance between supply and demand in 1985, the legislation specified gradual price increases for various categories of gas, based on a projected price of oil that today is considerably lower than current oil prices. This price disparity has promoted new inefficiencies in the allocation and consumption of natural gas and could, depending on oil prices and gas contract provisions, lead to a sharp increase in average wellhead prices in 1985. Thus, the smooth transition to a deregulated market envisioned by the framers of the Act may not occur. These problems have led many to propose alternative natural gas policies, ranging from outright decontrol to revision of pricing rules under NGPA.

This paper addresses the budgetary implications of alternative natural gas pricing policies. While other criteria for evaluation, such as energy policy and equity between consumers and producers are important, they are not the focus here. The effects of these natural gas policies on the federal budget are inextricably linked to their macroeconomic consequences. The economy's response to higher natural gas prices ultimately would change budget revenues and outlays. For example, inflation caused by higher prices

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1. The regulatory history and market characteristics of natural gas are discussed in Appendix A.

2. Interstate gas is produced in one state and sold in another. Intrastate gas is both produced and sold within the same state. Since regulation was first introduced in the gas market to control monopolistic interstate pipeline practices, the preponderance of regulation has grown in the interstate market.

would lead to higher individual income taxes by pushing taxpayers into higher tax brackets. [3] Higher prices would generate more revenues for natural gas producers, who consequently would pay higher royalties and income taxes. On the other hand, government outlays would increase because of inflationary effects on cost-of-living adjustments in benefit payments to individuals and increases in unemployment compensation. Hence, the budgetary effects of alternative natural gas policies would reflect the automatic adjustments built into federal spending and revenue policies. The Congress would either have to increase discretionary spending to offset the effects of inflation or allow its real level to fall.

While the effects of higher natural gas prices on federal spending and revenues would be sizable, these changes would offset each other to a degree. For example, complete decontrol on January 1, 1984, would reduce the fiscal year 1984 federal deficit by $3.6 billion. The impact on the economy, however, would be much more pervasive. For instance, complete decontrol would increase the average wellhead price of natural gas by about $1.00 per thousand cubic feet. This would result in a redirection of income that would be about half as large as the third year tax reduction enacted in the Economic Recovery Tax Act of 1981. Furthermore, gas price increases would alter relative prices throughout the economy and lead to additional effects on real spending and production activities. Thus, significant changes in natural gas policies could have macroeconomic effects that are comparable to those of a major fiscal program.

Chapter II discusses the relationship between gas pricing policy changes, the economy, and the budget. Estimates of the budgetary effects of natural gas decontrol are then presented. But these budgetary effects rely on a set of assumptions regarding oil prices, which play a large role in determining gas prices, and the conduct of monetary and fiscal policies during the transition to a decontrolled gas market. In Chapter III, these budgetary effects are examined under alternative oil price assumptions. In Chapter IV, they are measured under alternative assumptions regarding the conduct of fiscal and monetary policies.

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3. Under current law, this "bracket creep" would continue until 1985 when the indexing of individual income taxes is scheduled to take effect.

CHAPTER II. BUDGETARY EFFECTS OF NATURAL GAS PRICE DECONTROL

Changes in natural gas pricing policy would affect the federal budget in a variety of ways. Since higher natural gas prices would translate into increased revenues for gas producers, they would immediately raise royalties from federally owned gas-producing properties and generate higher tax receipts from gas producers. As higher natural gas prices led to greater inflation, unemployment, or both, tax revenues from other sectors of the economy, personal income taxes, and nondiscretionary federal programs would be affected. Thus, the budgetary impact of natural gas decontrol is rooted in the economy's response to higher gas prices and the ways in which the federal budget reflects changed economic conditions.

This chapter discusses these relationships and presents a methodology for analyzing these competing effects. It then estimates the effects of gas decontrol on the budget under a set of assumptions about oil prices (which set a benchmark for gas prices) and the conduct of fiscal and monetary policies during the transition to a decontrolled gas market. Under these assumptions, complete decontrol of natural gas at the wellhead on January 1, 1984 would reduce the fiscal year 1984 budget deficit by $3.6 billion.

ECONOMIC ADJUSTMENT PROCESS UNDER HIGHER NATURAL GAS PRICES

The adjustment of the economy to natural gas price increases is the result of several competing factors. The level and rate of increase in natural gas prices eventually would influence all consumption and production decisions through their effects on purchasing power and by changing the relative prices of energy and other goods. Higher natural gas prices would lower consumer discretionary income and, unless offset by price reductions for other items, would reduce the amount consumers could spend on nonenergy goods. These reductions in consumption expenditures would translate into lower business receipts and subsequently limit the ability of nonenergy goods producers to employ workers, purchase energy and materials, and pay returns on capital investments. In addition, producers of nonenergy goods and services that use natural gas would have to readjust their fuel and other input use in order to minimize costs. In contrast, gas producers would recirculate their additional revenues in the form of higher taxes, payrolls, or investment. The key economic question is whether this additional spending would offset output losses elsewhere in the economy.

These consumption and production adjustments eventually would lead to a different mix of economic activities and a more efficient use of resources. For example, higher natural gas prices would encourage reductions in gas use among existing users and thereby permit new gas users to substitute newly available decontrolled gas for the more expensive alternatives currently in use, such as electricity and home heating oil. This would eventually lower production costs and prices for finished goods. Furthermore, if price differentials among various categories of gas under NGPA were eliminated as a result of complete decontrol in the near term or the long-run exhaustion of gas in the regulated categories, then gas producers would allocate capital more efficiently by reducing capital expenditures on new, high-cost gas wells and increasing capital outlays to develop low-cost, old gas fields. This shift might reduce the total cost of producing natural gas.

The realization of these gains would depend on macroeconomic adjustments. Higher gas prices would generate additional revenues in the gas industry that could be used to increase gas production by hiring more capital, labor, and other productive resources, just as higher oil prices have stimulated investment and employment in the oil industry. If prices and wages fully and instantaneously adjusted to levels that equate supply with demand, then this shift in the relative importance of various economic sectors would not have to cause lower levels of output and employment. But a time lag would occur because the economy's resources are not perfectly flexible. Wages and prices do not move downward quickly in response to short-term market pressures. These short-term rigidities, combined with higher energy prices, would cause reductions in output and employment.

Natural Gas Prices and the Federal Budget

The interactions between the economy, natural gas markets, and the budget are the focal point of this analysis. These interactions are critical for several reasons. First, in the short term, the demand for energy is more sensitive to the level of income and output in the economy than to changes in energy prices. For example, the current low level of oil demand is partially the result of the recession. Second, the line of the causation between economic activity and energy demand is not one way. In other words, energy prices can have a substantial impact on economic activity. They are now recognized by many as one of the more important factors

influencing macroeconomic activity since 1973.[1] The macroeconomic consequences of alternative gas pricing policies, in turn, change revenues and expenditures in the federal budget. This analysis reports changes in revenues and expenditures that result from gas pricing policy, rather than absolute levels. These changes, however, can be applied to CBO's five-year budget projections, which serve as a baseline, in order to find the absolute levels.[2]

The sensitivity of the budget to individual changes in economic conditions can be summarized as follows:[3]

- Lower real economic growth or higher unemployment leads to a reduction in revenues, an increase in outlays, and an increase in the deficit.

- Higher inflation causes an increase in revenues that exceeds the increase in outlays and, hence, a smaller deficit.

- Higher interest rates lead to a small increase in revenues and a relatively larger increase in outlays and a higher deficit.

Since the effects of higher natural gas prices on interest rates are unresolved, the interest rate sensitivity of the budget is not considered in this chapter. To the extent that monetary authorities restricted the money supply in response to inflationary pressures from higher gas prices, higher interest rates might indeed result with substantial repercussions on the budget. If higher gas prices caused a greater demand for money, additional pressures on interest rates might result. This report initially assumes a completely accommodative monetary policy for the pricing alternatives considered in this paper. This assumption is varied in Chapter IV.

While the above rules of thumb are helpful guidelines, they are not adequate for this analysis. Changes in economic conditions do not occur in

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1. See, for example, Robert J. Gordon, Alternative Responses of Policy to External Supply Shocks, Brookings Papers on Economic Activity, 1, (1975), pp. 183-204; and M. Bruno and J. Sacks, Input Price Shocks and the Slowdown in Economic Growth, Working Paper No. 851, National Bureau of Economic Research, Inc. (February 1982).

2. Congressional Budget Office, The Economic and Budget Outlook: An Update (September 1982).

3. Ibid., Appendix B.

isolation, particularly in the case of energy. Higher energy prices affect inflation and output at the same time. Hence, methods that capture the interactions between energy, the economy, and the budget are used here in lieu of these rules of thumb.

The net change in federal tax revenues induced by natural gas price increases would primarily depend on the balancing of two effects. First, natural gas price increases would generate some additional inflation and, as a result, expand the corporate tax base and push individual taxpayers into higher tax brackets until indexing is adopted in 1985, after which only real individual income increases will be taxed. Royalty and corporate taxes paid by natural gas producers would also increase. The size of these increases would depend on the size of the natural gas price increases and any resulting demand reduction. The second effect would offset the first, as lower real growth associated with the adjustment to higher gas prices lowered employment and profit margins, thus reducing the nation's tax base.

On the outlay side of the budget, government expenditures on goods and services would increase because of the inflationary effects of higher natural gas prices. Outlays for direct payments to individuals would also increase because of cost-of-living adjustments in Social Security and other benefit programs. If lower growth induced by higher energy prices resulted in higher unemployment, then outlays for unemployment compensation would also rise.

METHODOLOGY

The analysis presented in this study consists of two principal steps. First, natural gas prices under three policy options--complete, partial, and administrative decontrol--are estimated. Then, based on these estimates, the macroeconomic and budgetary effects are calculated.

In the first year of any decontrol option, this study assumes that natural gas prices will be determined by contract provisions and oil prices. Since most gas is sold under long-term contracts that tie prices either to oil prices or to the rate of inflation, future gas price increases are preordained regardless of natural gas supply and demand conditions. Hence, for this analysis, natural gas prices are assumed to increase at the rate of oil price inflation after the initial year of decontrol. In the long run, gas prices will be affected by the supply and demand for gas, the price of alternative fuels, and the economy's adjustment to decontrol.

The second step of the analysis involves an examination of energy-economy interactions. Most previous work has used one of two major approaches to analyze these interactions. The first has examined the

effects of energy prices using existing macroeconometric models.[4] A major problem with this method is that most macroeconomic models do not realistically measure energy substitution possibilities and how these substitutions influence spending patterns and income flows in the economy. This could result in overestimation of the inflationary effects of decontrol that would, in turn, introduce an upward bias in tax revenue calculations.

The other major approach involves the examination of energy price changes in the context of long-term economic growth.[5] Unlike the major macroeconometric models, this method does not consider unemployment and price-wage rigidities. An additional problem is that the role of price expectations are not adequately considered. This approach could lead to an underestimation of the initial output losses associated with decontrol since price and wage rigidities and the gradual response of consumers and producers to higher gas prices are at the heart of the macroeconomic adjustment problem.

The analysis in this study combines aspects of both approaches.[6] Its main feature is the explicit linkage of energy demand relationships with macroeconomic aggregates. In other words, the demands for fuels are determined simultaneously with income, employment, and output, reflecting their interdependence. Substitution possibilities among fuels used by consumers and among energy and other inputs used by nonenergy producers are explicitly measured. This formulation permits a more accurate measurement of energy producer revenues and of how the economy would adjust to higher gas prices and the respending of gas revenues by energy producers. The effects of relative price changes on the composition of gross domestic product,[7] which are the focus of the second approach mentioned above, are

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4. The Wharton and Data Resources, Inc. models are two examples.

5. See, for example, E.A. Hudson, and D.W. Jorgenson, "U.S. Energy Policy and Economic Growth, 1975-2000," Bell Journal of Economics, vol. 5, no. 2 (Autumn 1974).

6. A detailed description of the analysis is presented in Congressional Budget Office, An Empirical Analysis of Energy-Economy Interactions (forthcoming).

7. Gross domestic product (GDP) is a national income concept based on production within the geographic borders of a country. Gross national product (GNP) covers production by and incomes to citizens of a country no matter where they live. GDP is used in this report because changes in gas prices would not appreciably affect income earned from foreign sources.

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explicitly considered through the measurement of labor, capital, material, and fuel substitution possibilities in the production of goods and services. This analysis also considers traditional demand side effects, such as income effects on consumption and output effects on investment that are measured in major macroeconomic models. [8]

In theory, macroeconomic modeling resembles a science, but in practice it is more of an art and, thus, less precise. Hence, results obtained from different econometric models will differ as do the models themselves. Consequently, the estimates of the macroeconomic and budgetary effects presented in this report should not be construed as definitive and unerring statements. They do, however, strongly indicate the magnitude and direction of these effects.

ASSUMPTIONS

The results presented in this report are sensitive to underlying assumptions regarding oil prices and the conduct of fiscal and monetary policies. The assumptions used in this analysis are discussed in the following sections.

Oil and Other Energy Price Assumptions

Oil prices determine, in large part, the level to which deregulated gas prices would rise. Oil is the fuel with which gas competes in most of its applications, either as distillate fuel (heating oil) in household use or as residual oil in industrial uses. Moreover, many long-term gas contracts set the price of their gas, upon decontrol, according to a formula based on the price of oil. For the purposes of this analysis, the price of oil is assumed to rise to about $39.00 per barrel in 1985 (in 1985 dollars) and increase at an assumed 7 percent annual rate of inflation thereafter. Alternative oil price paths are examined in Chapter III.

Besides wellhead oil and natural gas prices, growth rates for other nominal energy prices must also be assumed for this analysis. Prices for refined oil products are assumed to increase with wellhead oil price increases. Similarly, natural gas prices for residential, commercial, industrial, and electric utility customers move with wellhead natural gas prices

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8. Key concepts and assumptions used to calculate macroeconomic and budgetary adjustments induced by higher gas prices are described in Appendix B.

so that wholesale and retail markups remain constant. After 1985, nominal wellhead natural gas and oil prices are assumed to increase at a 7 percent annual rate. Nominal coal prices are assumed to increase about 5 percent per year. Electricity prices are assumed to increase slightly faster than the underlying inflation rate (approximately 7 percent) and reflect both the rate of assumed increase in oil and coal prices and the need to retire older generating units over time.

Fiscal and Monetary Policy Assumptions

Assumptions regarding the conduct of fiscal and monetary policies also affect the results of this analysis. Two assumptions are made about fiscal policy. First, it is assumed that the statutes governing nondiscretionary spending remain in effect. Thus, should inflation or unemployment increase because of decontrol, expenditures for items such as food stamps, unemployment benefits, and Social Security payments reflect the increases. Second, in this chapter, it is assumed that discretionary expenditures, such as spending for military and other federally procured goods and services, increase at the inflation rate, so that the real level of discretionary spending is preserved. This assumption is varied in Chapter IV. (As inflation increases, discretionary expenditures would decrease in real terms unless the Congress acted to maintain their real level.)

Assumptions regarding the conduct of monetary policy are also critical. Higher prices for natural gas would raise the amount of money that firms and households sought to carry out their transactions. In the light of this initial increase in the transactions demand for money, monetary policy could vary from complete accommodation (allowing the supply of money to increase by the amount that natural gas bills rise) to complete nonaccommodation (fixing the supply of money at some predetermined rate of growth, regardless of any increase in gas prices). The analysis presented in this chapter assumes complete accommodation. If nonaccommodation were to occur, gas price decontrol would result in less inflation but greater losses in output and employment than are described in this chapter. Alternative monetary policy assumptions are incorporated into the analysis in Chapter IV.

THE NGPA, POLICY OPTIONS, AND NATURAL GAS PRICES

NGPA Price Regulations and Options

This report contrasts three natural gas pricing policies to the price path suggested by the NGPA, which serves as the base case. The NGPA

divided all of the nation's gas into three groups for price regulation. The provisions of the NGPA are presented in Table 1, classified into three major categories: supply incentives, consumer protection, and the intrastate market. The first price group (Section 107) was immediately deregulated in 1978. The second group (Sections 102, 103, 105, and some gas under Section 106b) was assigned a price set by formula until January 1, 1985, when it would be deregulated. The third group (Sections 104, 106a, some gas under 106 b, 108, and 109) was assigned formula-based prices and was not decontrolled; their price formulas remain in force in perpetuity. Thus, the NGPA allows a partial deregulation of gas prices on January 1, 1985. Budgetary and macroeconomic effects are reported as changes from CBO's baseline macroeconomic and budgetary projections, which reflect the NGPA. 9

The three policy options discussed in this report are:

- Complete Decontrol. All wellhead gas prices would be decontrolled on January 1, 1984, regardless of their treatment under the NGPA.

- Partial Decontrol. All gas prices that would be decontrolled in 1985 under the NGPA would be decontrolled on January 1, 1984. This, in effect, advances the partial deregulation under NGPA by one year.

- Administrative Decontrol. All gas from older wells in the interstate market (NGPA Sections 104, 106, and 109) would be allowed the higher regulated price afforded gas from new wells (Section 103) on January 1, 1983. Otherwise, the provisions of the NGPA would remain in force.

Natural Gas Prices Under NGPA and The Options

The level of natural gas prices under NGPA and the three policy options would depend on oil prices and contract provisions between producers and purchasers not commonly found in other markets. The contract provisions are important to consider under decontrol since they would largely determine the amount of gas that reaches oil prices. The average wellhead natural gas price, therefore, will be a weighted average of gas that is priced at or near oil prices and gas with prices below oil prices. Table 2

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9. Congressional Budget Office, The Economic and Budget Outlook: An Update (September 1982).

TABLE 1. OVERVIEW OF THE NATURAL GAS POLICY ACT OF 1978 a

Sections	Description	Price Escalation Formula	Status as of 1/1/85
Supply Incentives			
102	New natural gas outside existing fields; new reservoirs; new outer continental shelf fields	Inflation plus real growth premium	Deregulated
103	New onshore wells within existing fields	Inflation	Deregulated
107	High-cost gas	Deregulated immediately	Deregulated
108	Stripper wells	Same as 102	Regulated
Consumer Protection			
104	Interstate gas	Same as 103	Regulated
106a	Renegotiated interstate contracts	Same as 103	Regulated
109	All other gas	Same as 103	Regulated
Intrastate Market			
105	Intrastate gas	Tied to new gas prices	Deregulated
106b	Renegotiated intrastate contracts	Same as 103	Deregulated if contract price is greater than $1.00 per thousand cubic feet

a. The provisions of the NGPA are described more fully in Appendix A.

TABLE 2. NATURAL GAS PRICE PROJECTIONS UNDER ALTERNATIVE GAS PRICING POLICY OPTIONS (By calendar year, in nominal dollars per thousand cubic feet)

Calendar Year	NGPA	Complete Decontrol	Partial Decontrol	Administrative Decontrol
1983	2.75	2.75	2.75	2.87
1984	3.11	4.10	3.43	3.24
1985	3.83	4.38	3.83	3.83
1986	4.10	4.69	4.10	4.10
1987	4.38	5.01	4.38	4.38

NOTE: The figures in this table are average wellhead natural gas prices.

shows the estimated average wellhead prices of natural gas under NGPA and the three policy options for calendar years 1983-1987. Under NGPA, average wellhead natural gas prices increase 23 percent in 1985 from their 1984 levels to $3.83 per thousand cubic feet. If complete decontrol was adopted on January 1, 1984, then gas prices would increase 49 percent in that year to $4.10 per thousand cubic feet. A partial decontrol of gas prices in 1984 would increase wellhead prices approximately 25 percent. Finally, administrative decontrol in 1983 would involve a 19.1 percent increase in average wellhead prices from their 1982 levels of $2.41 per thousand cubic feet as opposed to a 14.1 percent increase under NGPA.

Many analysts have predicted that high oil prices combined with rigid contract provisions would lead to sharp increases in average natural gas wellhead prices under NGPA's partial deregulation in 1985 or under the complete and partial decontrol options in 1984. The estimates presented in this report are lower for two major reasons. First and foremost, the oil price forecasts are much lower than those found in previous studies. [10] Second, this study incorporates information on contract provisions, which indicates the proportion of gas that would rise to oil prices upon decontrol. [11] The major assumption here is that all contracts will be

10. See, for example, U.S. Department of Energy, A Study of Alternatives to the Natural Gas Policy Act of 1978 (November 1981).

11. This information is taken from U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Natural Gas Producer/Purchaser Contracts and Their Potential Impacts on the Natural Gas Market (June 1982).

implemented as they are written. Therefore, renegotiation of contracts and invocation of "force majeure" clauses are not considered. [12]

Natural gas prices are directly and indirectly affected by oil prices through several key contract provisions: [13]

- Most-favored-nation clauses set gas prices at an average of the two or three highest prices being paid in the producer's area. These options are sometimes referred to as "two-party or three-party most-favored-nation clauses."

- Oil parity provisions tie the price of gas, often in the event of deregulation, to the price of crude oil or distillate oil.

- Take-or-pay provisions require the buyer to pay for predetermined quantities of gas at prespecified prices whether they are purchased or not.

By pegging gas prices at their highest levels, the most-favored-nation clauses would transmit the oil price to other contracts. Take-or-pay provisions would limit the extent to which gas prices could decline. Thus, with decontrol, average natural gas prices might be quickly forced toward the oil prices with little chance of falling in response to supply and demand adjustments.

Under NGPA, the large amount of intrastate gas, compared to interstate gas, to be deregulated in 1985, would tend to dampen price increases, because it has a relatively smaller proportion of contracts with deregulation provisions containing most-favored-nation clauses. More than three times more gas would be decontrolled in the intrastate market than in the interstate market, leading to an estimated 23 percent increase in the average wellhead price between 1984 and 1985. Only 39 percent of the intrastate gas has contract deregulation provisions and, of this amount, 42

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12. "Force majeure" refers to an unexpected and disruptive event that may operate to excuse a party from a contract. Recently, Columbia Gas Transmission Company blamed the current recession for its load loss and since, it argued, this constituted an event outside its control, the company should be excused from buying minimum purchases of gas from Texas Gas Transmission Company. This case has not been resolved.

13. A more detailed discussion of contract provisions appears in Appendix A.

percent has most-favored-nation clauses. In contrast, about 87 percent of gas in the interstate market has deregulation clauses and, of this amount, 84 percent is governed by most-favored-nation clauses. [14] The price projections under NGPA before 1985 assume that the nominal wellhead natural gas price would increase at an annual rate of 13 to 14 percent.

The estimated increases in wellhead gas prices in 1984 under the complete and partial decontrol options also reflect contract provisions. Under complete decontrol in 1984, gas prices would increase 49 percent, which presumes that roughly 30 percent of all gas would reach oil equivalent prices. The remaining 70 percent would have an average price of $3.11 per thousand cubic feet so that the average wellhead price would be $4.10 per thousand cubic feet. These proportions and prices reflect continued softness in world oil prices and the fact that a majority of contracts do not explicitly tie gas prices to oil prices.

BUDGETARY EFFECTS OF THE POLICY OPTIONS

The complete decontrol of wellhead natural gas prices on January 1, 1984, would reduce the fiscal year 1984 budget deficit by $3.6 billion compared to the CBO baseline. [15] After 1985, the inflationary effects of higher gas prices would dominate so that the cumulative net effect over the 1984 to 1987 period would be a $5.0 billion reduction in the deficit. Partial decontrol in 1984 would reduce the fiscal year 1984 deficit by $1.1 billion. The administrative decontrol option would have only a minor effect on the federal budget.

Complete Decontrol in 1984

The complete decontrol option would eliminate price ceilings for all categories of natural gas under the NGPA. This would free gas prices to move toward their equilibrium relationship with oil prices. The adjustment of natural gas prices in the first year of decontrol, however, would be determined largely by price provisions contained in natural gas

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14. These data are from U.S. Department of Energy, Natural Gas Producer/Purchaser Contracts and Their Potential Impacts on the Natural Gas Market (June 1982).

15. All budgetary changes in this section are changes from the CBO baseline.

producer/purchaser contracts. Natural gas prices after this time would probably move in tandem with oil market developments.

Macroeconomic Effects of Complete Decontrol. The estimated effects of complete decontrol on output, inflation, and energy demand are presented in Table 3. Complete decontrol on January 1, 1984 would reduce gross domestic product by 0.3 percent in that year. After 1984, gross

TABLE 3. MACROECONOMIC AND ENERGY DEMAND EFFECTS OF COMPLETE NATURAL GAS DECONTROL IN 1984 UNDER BASE ASSUMPTIONS; CHANGES FROM THE BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Real Gross Domestic Product (GDP) (percent change)	-0.30	0.01	0.04	0.03
Inflation (rate of change)				
GDP deflator	1.10	-0.40	0.00	0.00
Consumer Price Index	1.00	-0.30	0.00	0.00
Unemployment Rate	0.10	-0.06	-0.05	0.00
Natural Gas Demand (percent change)	-2.50	-1.80	-1.30	-1.20
Oil Imports (percent change)	0.60	0.60	0.30	0.30
Nominal Wellhead Natural Gas Prices				
Percent change	31.80	14.40	14.40	14.40
Percent point change [a]	36.00	-16.30	0.00	0.00

a. Percent point change is a change in a rate of change. For example, since the base case under NGPA involves a 23.7 percent point change in the average wellhead gas price in 1985 and since gas prices increase only 7 percent points in 1985 under complete decontrol, the gas price increase under complete decontrol is 16.3 percent points less than the increase under NGPA in 1985.

domestic output would increase slightly because of generally lower rates of increase in gas prices compared to the NGPA base case (see Table 3) and because substitutions among fuels and other inputs would generate efficiency gains. These later output gains, however, would not offset the first year loss. The cumulative reduction in real gross domestic output over the 1984-1987 period would be about $6.7 billion (in 1982 dollars).

The complete decontrol option would increase the domestic product price level by 1.0 percent in 1984 and by roughly 0.6 percent annually from 1985 through 1987. In 1985 the rate of inflation would be considerably lower than the NGPA base case, however, since gas prices under complete decontrol would increase at a much lower rate of 7 percent rather than the 23 percent under NGPA. Thus, even though the level of prices would be higher in 1985, the inflation rate would be lower. While complete decontrol would add about one-tenth of a percentage point to the unemployment rate in 1984, it would actually reduce the jobless rate as real output increased afterward.

Natural gas consumption would decline by 2.5 percent in 1984, induced by higher gas prices, which would be 32 percent above the NGPA base case. The reductions in gas demand would be smaller during 1985 and 1987 as accessibility to gas improved. Higher prices, however, would dominate increased accessibility. Oil imports would increase as the substitution of gas for oil resulting from greater accessibility to gas was offset by higher gas prices.

Budgetary Effects of Complete Decontrol. The estimated budgetary effects of complete natural gas decontrol are presented in Table 4. Complete decontrol would reduce the fiscal year 1984 deficit by about $3.6 billion. Forty-six percent of the $6.9 billion increase in 1984 revenues and gas royalties would come from higher individual income taxes caused by bracket creep resulting from the inflationary effect of higher gas prices. Corporate taxes and royalties paid by natural gas producers would increase by approximately $2.0 billion in 1984.

After 1985, the complete decontrol option would result in small reductions in the deficit. Therefore, the cumulative net change over the fiscal year 1984-1987 period would be a deficit reduction of $5.0 billion. Deficit reductions are smaller after 1984 primarily because the inflation generated by decontrol would increase benefit payments to individuals along with the growth in federal revenues.

TABLE 4. NET BUDGETARY EFFECTS OF COMPLETE NATURAL GAS DECONTROL; CHANGES FROM THE CBO BASELINE (By fiscal year, in billions of nominal dollars)

Budget Component	1984	1985	1986	1987
Revenues				
Individual income taxes	3.2	2.2	2.6	3.1
Corporate income taxes (nonmining)	0.3	0.2	0.2	0.2
Federal excise taxes	0.1	0.1	0.1	0.1
Social insurance taxes	1.3	1.0	1.2	1.6
Corporate income taxes (mining)	1.0	0.6	0.6	0.6
Total revenues	5.9	4.1	4.7	5.6
Outlays				
Benefit payments for individuals	0.9	2.2	3.3	3.6
Government purchase of goods and services	2.4	1.7	1.8	2.1
Natural gas royalties (offsetting receipts)	-1.0	-0.5	-0.6	-0.6
Total outlays	2.3	3.4	4.5	5.1
Net Budgetary Effect [a]	3.6	0.7	0.2	0.5

a. Positive numbers indicate a reduction in the deficit.

Partial Decontrol in 1984

The partial decontrol option would simply implement in 1984 the scheduled price increases slated to occur under NGPA in 1985. Since this option would not substantially change the structure of natural gas pricing, the efficiency gains resulting from increased accessibility to gas would be very small. Therefore, the simulations measuring the effects of partial decontrol were made assuming the NGPA base case scenario in which accessibility to gas gradually improves over the 1985-1987 period rather than immediately.

Macroeconomic Effects of Partial Decontrol. The major macroeconomic and energy demand effects of the partial decontrol option are presented in Table 5. Partial decontrol would reduce gross domestic product

TABLE 5. MACROECONOMIC AND ENERGY DEMAND EFFECTS OF PARTIAL NATURAL GAS DECONTROL IN 1984 UNDER BASE ASSUMPTIONS; CHANGES FROM THE BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Real Gross Domestic Product (GDP) (percent change)	-0.10	0.05	0.03	0.00
Inflation (rate of change)				
GDP deflator	0.40	-0.30	0.00	0.00
Consumer Price Index	0.30	-0.30	0.00	0.00
Unemployment Rate	0.00	0.00	0.00	0.00
Natural Gas Demand (percent change)	-1.00	-0.30	-0.20	-0.10
Oil Imports (percent change)	0.30	0.20	0.10	0.10
Nominal Wellhead Natural Gas Prices				
Percent change	10.30	0.00	0.00	0.00
Percent point change [a]	11.60	-11.50	0.00	0.00

a. Percent point change is a change in a rate of change. For example, since the base case under NGPA involves a 23.7 percent point change in the average wellhead gas price in 1985 and since gas prices increase only 7 percent points in 1985 under partial decontrol, the gas price increase under partial decontrol is 11.5 percent points less than the increase under NGPA in 1985.

in 1984 by approximately 0.1 percent from the NGPA base case. The rate of change in the gross domestic product price deflator would increase by 0.4 percent in 1984 (see Table 5). Natural gas demand would be 1.0 percent lower in 1984 and gradually decline thereafter. As under the complete decontrol option, oil imports would increase.

After 1985, real gross domestic product (GDP) would be slightly higher than in the base case. This would be caused primarily by price-induced

reductions in natural gas demand and the fact that gas prices after 1985 would be no higher than those that would be reached under the NGPA base case. The increases in real GDP in 1985 and 1986 would slightly more than offset the decrease in real GDP in 1984, producing a net gain in real output of about $0.2 billion (in 1982 dollars) over the period. Thus, the long-term efficiency gains in gross output would offset the short-term macroeconomic adjustment costs imposed by the partial decontrol option. This is in sharp contast to the complete decontrol option which reflects the deleterious economic effects of sharp increases in energy prices.

Budgetary Effects of Partial Decontrol. The budgetary effects of partial decontrol exhibit a different pattern to those associated with complete decontrol: the first year budgetary surplus is offset by deficits in later years. The budgetary implications of partial decontrol are displayed in Table 6. The net budgetary effect of partial decontrol in 1984 would reduce the deficit by $1.1 billion. The cumulative effect for the fiscal year 1984-1987 period, however, is a $0.2 billion increase in the deficit.

Administrative Decontrol in 1983

Administrative decontrol refers to changes in pricing and classification rules that the Federal Energy Regulatory Commission (FERC) could implement under NGPA. Any final action on an administrative decontrol policy would involve a compromise between the Congress, FERC, and other interested parties. In fact, the latitude that FERC is allowed under current law is not clearly defined. Therefore, this report discusses the effects of one possible administrative decontrol option to provide some contrast to the other two options. Under the option presented here, the economy would have more time to adjust to higher gas prices.

There are a myriad of administrative decontrol options that could conceivably receive serious consideration in 1983. The administrative decontrol option considered here would allow prices for NGPA Sections 104, 106 and 109 to rise to the Section 103 price level on January 1, 1983. This action would result in a 19.1 percent increase in natural gas prices in 1983, compared to a 14.1 percent increase in the NGPA base case. This price increase is small relative to the complete and partial decontrol options for three reasons. First, the differential between the NGPA base case natural gas prices and the Section 103 price is only $0.50 per thousand cubic feet. Second, the amount of reclassified gas is only 32 percent of the total supply. Finally, because of the existence of fixed price escalators in those contracts covering the reclassified gas, only about 70 percent would actually reach the Section 103 price. This latter factor illustrates the somewhat less than

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TABLE 6. NET BUDGETARY EFFECTS OF PARTIAL NATURAL GAS DECONTROL; CHANGES FROM THE CBO BASELINE (By fiscal year, in billions of nominal dollars)

Budget Component	1984	1985	1986	1987
Revenues				
Individual income taxes	1.1	0.1	0.2	0.2
Corporate income taxes (nonmining)	0.1	0.0	0.0	0.0
Federal excise taxes	0.0	0.0	0.0	0.0
Social insurance taxes	0.4	0.1	0.1	0.1
Corporate income taxes (mining)	0.3	0.0	0.0	0.0
Total revenues	1.9	0.2	0.3	0.3
Outlays				
Benefit payments for individuals	0.3	0.6	0.7	0.5
Government purchase of goods and services	0.8	0.1	0.1	0.1
Natural gas royalties (offsetting receipts)	-0.3	0.0	0.0	0.0
Total outlays	0.8	0.7	0.8	0.6
Net Budgetary Effect [a]	1.1	-0.5	-0.5	-0.3

a. Positive numbers indicate a reduction in the deficit; negative numbers indicate an increase.

complete impact that regulatory actions have on prices because of producer/purchaser contract provisions.

Macroeconomic Effects of Administrative Decontrol. Administrative decontrol would produce small reductions in output and slight increases in inflation during 1983 and 1984. The macroeconomic and energy demand effects of administrative decontrol are presented in Table 7. Real gross domestic product would decline by 0.05 percent in 1983 and 0.03 percent in 1984. Annual inflation would increase by 0.2 percent in 1983. The reduction in natural gas demand would be 0.4 percent in 1983, peak at 0.6 percent in 1984, and gradually decline after 1985.

The cumulative effect of administrative decontrol on real output and prices would be similar to those effects estimated for partial decontrol

TABLE 7. MACROECONOMIC AND ENERGY DEMAND EFFECTS OF ADMINISTRATIVE DECONTROL IN 1983 UNDER BASE ASSUMPTIONS; CHANGES FROM THE BASE CASE (By calendar year)

Variable	1983	1984	1985	1986	1987
Real Gross Domestic Product (GDP) (percent change)	-0.05	-0.03	0.03	0.02	0.00
Inflation (rate of change)					
GDP deflator	0.20	0.00	-0.20	0.00	0.00
Consumer Price Index	0.20	0.00	-0.10	0.00	0.00
Unemployment Rate	0.00	0.00	0.00	0.00	0.00
Natural Gas Demand (percent change)	-0.40	-0.60	-0.20	-0.10	-0.10
Oil Imports (percent change)	0.10	0.20	0.10	0.10	0.00
Nominal Wellhead Natural Gas Prices					
Percent change	4.40	4.20	0.00	0.00	0.00
Percent point change [a]	5.00	-0.10	-5.10	0.00	0.00

a. Percent point change is a change in a rate of change. For example, since the base case under NGPA involves a 23.7 percent point change in the average wellhead gas price in 1985 and since gas prices increase only 7 percent points in 1985 under administrative decontrol, the gas price increase under administrative decontrol is 5.1 percent points less than the increase under NGPA in 1985.

except that the increases in gross output would not offset the short-term losses. This would occur because gas prices would be higher than the base case in both 1983 and 1984, whereas in the partial decontrol option prices would be higher only in 1984.

Budgetary Effects of Administrative Decontrol. Since the macroeconomic effects of administrative decontrol would be relatively small, the impact on the federal budget would be equally minor. The estimated effects

of administrative decontrol on federal revenues and outlays are presented in Table 8. The net budgetary effect in fiscal year 1983 would reduce the deficit by $0.4 billion. In 1984, the change in revenues because of administrative decontrol would again exceed the change in outlays, causing the deficit to decline by $0.3 billion. After 1984, the deficit would be increased $0.5 billion, $0.4 billion, and $0.2 billion in fiscal years 1985, 1986, and 1987, respectively. The cumulative net budgetary effect of administrative decontrol over the period 1983 to 1987 would increase the deficit by $0.4 billion. In conclusion, the size of these effects strongly suggests that budgetary considerations, although relevant, should not be a primary element in any debate involving relatively small changes in natural gas prices.

TABLE 8. NET BUDGETARY EFFECTS OF ADMINISTRATIVE NATURAL GAS DECONTROL; CHANGES FROM THE CBO BASELINE (By fiscal year, in billions of nominal dollars)

Budget Component	1983	1984	1985	1986	1987
Revenues					
Individual income taxes	0.4	0.6	0.1	0.1	0.1
Corporate income taxes (nonmining)	0.0	0.1	0.0	0.0	0.0
Federal excise taxes	0.0	0.0	0.0	0.0	0.0
Social insurance taxes	0.2	0.2	0.1	0.1	0.1
Corporate income taxes (mining)	0.1	0.1	0.0	0.0	0.0
Total revenues	0.7	1.0	0.2	0.2	0.2
Outlays					
Benefit payments for individuals	0.1	0.4	0.6	0.5	0.3
Government purchase of goods and services	0.3	0.4	0.1	0.1	0.1
Natural gas royalties (offsetting receipts)	-0.1	-0.1	0.0	0.0	0.0
Total outlays	0.3	0.7	0.7	0.6	0.4
Net Budgetary Effect [a]	0.4	0.3	-0.5	-0.4	-0.2

a. Positive numbers indicate a reduction in the deficit; negative numbers indicate an increase.

CHAPTER III. SENSITIVITY OF DECONTROL EFFECTS TO OIL PRICES

The decontrol of wellhead natural gas prices on January 1, 1984 would reduce the federal deficit by $3.6 billion in fiscal year 1984. This estimate, presented in Chapter II, is based on the assumption that oil prices, which would influence the price of decontrolled gas, will rise gradually to about $39.00 per barrel in 1985. As this chapter demonstrates, however, different oil price assumptions can lead to different conclusions about the effects of natural gas decontrol on the federal deficit. If oil prices rose to a higher level--about $44.00 per barrel in 1985--the fiscal year 1984 deficit would be reduced by $7.0 billion under complete decontrol. If they fell to $28.00 per barrel by 1985, complete decontrol would reduce the deficit by only $1.4 billion.

This chapter first presents these high and low oil price alternatives to the base assumption used in Chapter II. It then discusses the budgetary implications of complete and partial decontrol policies under these alternatives.

HIGH AND LOW OIL AND GAS PRICES

Table 9 presents three possible oil price paths. Under the base assumption, employed in Chapter II, oil prices would rise to about $39.00 per barrel in 1985. An alternative high path would raise oil prices to $44.00 per barrel in 1985. The high price alternative could occur if economic recovery was so robust that it increased oil demand. It might also happen if the Iran-Iraq War continued indefinitely and reduced both nations' oil exports. Both of these circumstances would lead to tight gas markets and high oil prices. A low path would cause oil prices to drop to $28.00 per barrel in that year. The low path could occur if either economic recovery or oil demand continued to be weak, or if OPEC was unable to sustain its present agreements to limit production. Under these conditions, gas markets would be oversupplied and oil prices low.

Table 10 presents estimates for the average wellhead natural gas prices under NGPA in 1985, when a proportion of natural gas is scheduled to be decontrolled. The high price for natural gas at the wellhead in 1985 would be $4.41, almost 42 percent higher than the 1984 price. The base assumption would be the most likely outcome, with a gas price of $3.83 per

TABLE 9. ALTERNATIVE DOMESTIC WELLHEAD OIL PRICE ASSUMPTIONS (By calendar year, in nominal dollars per barrel)

Calendar Year	High Oil Price	Base Oil Price	Low Oil Price
1982	30.78	30.78	30.78
1983	36.00	34.00	30.00
1984	39.00	36.38	28.00
1985	44.00	38.93	28.00

thousand cubic feet, over 23 percent higher than the 1984 price. Finally, at the low end of the range, gas would cost $3.58 per thousand cubic feet, representing a 15 percent increase over 1984.

The proportions listed in the first two lines of Table 10 reflect a range of possibilities for the amount of gas that will be decontrolled in 1985 under NGPA and for the amount with prices reaching the oil price. [1] The proportion of all natural gas that will be decontrolled in 1985 lies between 25 and 40 percent. This range represents estimates of the 1985 level of natural gas production from each of the deregulated categories (NGPA Sections 102, 103, 105, and 106(b)) in response to higher or lower oil and, correspondingly, gas prices. The quantity of gas produced under Section 102 (new natural gas), will probably increase and gas volumes under Section 105 (intrastate gas) will decline. The net change in total deregulated gas is, however, uncertain since the relative composition of the gas supply is very difficult to predict.

The natural gas prices in Table 10 are computed by adding the "reference" price in 1985 (that is, the 1984 price multiplied by an escalation rate of 13 percent) to an increment equal to the proportion of all gas reaching oil parity multiplied by the difference between the price of oil and "reference" natural gas price. The natural gas price under the base oil price scenario is 56 percent of the wellhead crude oil price. The higher ratio for the low case indicates that the market distortion caused by NGPA is relatively smaller as oil prices decline.

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1. U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Natural Gas Producer/Purchaser Contracts and Their Potential Impacts on the Natural Gas Markets (June 1982).

TABLE 10. CONSTRUCTION OF AVERAGE WELLHEAD NATURAL GAS PRICES IN 1985 UNDER NGPA AND ALTERNATIVE OIL PRICE ASSUMPTIONS

	High Oil Price	Base Oil Price	Low Oil Price
Proportion of All Gas Decontrolled [a]	0.40	0.32	0.25
Proportion of Decontrolled Gas Rising to Oil Prices [a]	0.53	0.30	0.20
Oil Prices in Equivalent Gas Units (dollars per thousand cubic feet)	7.78	6.89	4.95
Natural Gas Price (dollars per thousand cubic feet)	4.41	3.83	3.59
Gas/Oil Price Ratio	0.57	0.56	0.72

a. These proportions were calculated from Tables 18 and 19 in U.S. Department of Energy, Natural Gas Producer/Purchaser Contracts and their Potential Impacts on the Natural Gas Market (June 1982). The effect of oil prices on the proportion of gas to be decontrolled is explained in the text.

The level of oil prices not only determines the level of gas prices under the NGPA, but also determines the price to which gas will rise under other deregulation proposals as well. Table 11 depicts projected wellhead gas prices under complete decontrol for each of the three oil price paths. With oil prices higher than the base price assumption, gas prices would rise by 86 percent under complete decontrol, from $2.75 per thousand cubic feet in 1983 to $5.12 in 1984. If the lower price path prevailed, decontrol would only raise gas prices by 26 percent, to $3.47 in 1984. Table 12 presents similar estimates for the partial decontrol option. The low oil price scenario would result in a 16 percent increase in wellhead gas prices under partial decontrol, from $2.75 per thousand cubic feet in 1983 to $3.20 in 1984, while the high price case would result in a 42 percent increase, from $2.75 per thousand cubic feet to $3.91 in 1984.

TABLE 11. SCENARIOS FOR AVERAGE WELLHEAD NATURAL GAS PRICES UNDER COMPLETE DECONTROL IN 1984 (By calendar year, in nominal dollars per thousand cubic feet)

Calendar Year	High Oil Price	Base Oil Price	Low Oil Price
1983	2.75	2.75	2.75
1984	5.12	4.10	3.47
1985	5.48	4.38	3.71
1986	5.86	4.69	3.97
1986	6.27	5.01	4.25

TABLE 12. SCENARIOS FOR WELLHEAD NATURAL GAS PRICES UNDER PARTIAL DECONTROL IN 1984 (By calendar year, in nominal dollars per thousand cubic feet)

Calendar Year	High Oil Price	Base Oil Price	Low Oil Price
1983	2.75	2.75	2.75
1984	3.91	3.43	3.20
1985	4.41	3.83	3.58
1986	4.72	4.10	3.83
1987	5.05	4.38	4.10

BUDGETARY EFFECTS OF GAS DECONTROL UNDER ALTERNATIVE PRICE SCENARIOS

The budgetary effects of gas decontrol have been presented to this point in the form of changes from the CBO baseline projections. However, higher (or lower) oil prices would do more than influence the level of these departures from the baseline budgetary projections; they would also change the baselines themselves. Higher oil prices would raise oil windfall profits and other tax collections, while the resulting inflation would increase spending for indexed payments for individuals.

NGPA Base Case. Even if NGPA remained in force, higher oil prices would reduce the federal deficit somewhat since taxes would increase more than spending (see Table 13). The budget deficit would shrink by $3.3 billion in fiscal year 1984. In fiscal year 1985, the deficit would be reduced by $7.3 billion because both natural gas and oil prices would increase from the base price scenario. The cumulative deficit reduction for fiscal years 1983-1987 would be $25.3 billion. Corporate and windfall profits taxes and royalties paid by the mining sector would increase sharply in fiscal year 1985. The effective corporate tax rate used to compute the change in corporate taxes in the mining sector is 25.6 percent. This method assumes that corporations would not utilize unused tax credits on foreign income taxes to shelter additional U.S. income from oil and gas sales. If the foreign credits were

TABLE 13. NET BUDGETARY EFFECTS OF THE HIGH OIL PRICE SCENARIO UNDER NGPA; CHANGES FROM THE CBO BASELINE (By fiscal year, in billions of nominal dollars)

Budget Component	1983	1984	1985	1986	1987
Revenues					
Individual income taxes	1.6	2.8	6.4	7.7	9.4
Corporate income taxes (nonmining)	-0.1	0.0	0.1	0.2	0.2
Federal excise taxes	0.1	0.1	0.2	0.3	0.4
Social insurance taxes	0.5	0.8	2.5	3.3	4.1
Corporate income taxes (mining)	0.5	0.9	2.4	2.6	2.6
Windfall profits	1.4	1.8	3.5	3.8	4.1
Total revenues	4.0	6.4	15.1	17.9	20.8
Outlays					
Benefit payments for individuals	0.4	1.6	4.0	7.0	9.6
Government purchase of goods and services	1.0	1.5	4.3	5.2	6.0
Natural gas royalties (offsetting receipts)	0.0	0.0	-0.5	-0.6	-0.6
Total outlays	1.4	3.1	7.8	11.6	15.0
Net Budgetary Effect [a]	2.6	3.3	7.3	6.3	5.8

a. Positive numbers indicate a reduction in the deficit.

fully utilized, then the effective rate would drop to roughly 4 percent. This would lower the deficit reduction in 1985 by $2 billion, from $7.3 billion to $5.3 billion.

The budgetary implications of the low oil price scenario under NGPA are presented in Table 14. This scenario would result in higher deficits through fiscal year 1987, primarily because of lower tax receipts. The cumulative increase in the deficit for fiscal years 1983-1987 would be $41.3 billion.

TABLE 14. NET BUDGETARY EFFECTS OF THE LOW OIL PRICE SCENARIO UNDER NGPA; CHANGES FROM THE CBO BASELINE (By fiscal year, in billions of nominal dollars)

Budget Component	1983	1984	1985	1986	1987
Revenues					
Individual income taxes	-3.2	-8.2	-11.2	-13.6	-16.5
Corporate income taxes (nonmining)	0.1	0.1	-0.2	-0.4	-0.4
Federal excise taxes	-0.1	-0.2	-0.4	-0.6	-0.7
Social insurance taxes	-1.0	-2.5	-4.5	-5.9	-7.3
Corporate income taxes (mining)	-0.9	-2.3	-3.0	-3.1	-3.2
Windfall profits	-2.8	-5.8	-7.6	-8.2	-8.7
Total revenues	-7.9	-18.9	-26.9	-31.8	-36.8
Outlays					
Benefit payments for individuals	-0.9	-4.1	-9.5	-14.9	-18.5
Government purchase of goods and services	-2.1	-4.8	-7.6	-9.0	-10.4
Natural gas royalties (offsetting receipts)	0.0	0.0	0.2	0.3	0.3
Total outlays	-3.0	-8.9	-16.9	-23.6	-28.6
Net Budgetary Effect a	-4.9	-10.0	-10.0	-8.2	-8.2

a. Positive numbers indicate a reduction in the budget deficit; negative numbers indicate an increase.

In conclusion, the budgetary sensitivity of NGPA to oil price changes is fairly small. Even with oil prices as high as $44 per barrel in 1985 or as low as $28 per barrel in 1985, the changes in the 1985 deficit would be a $7.3 billion reduction and a $10 billion increase, respectively.

Complete Decontrol in 1984

Sensitivity estimates of output, inflation, natural gas demand, and net budgetary balance to oil price changes under complete decontrol are presented in Table 15. In 1984, this decontrol option under high oil prices would reduce output by 0.6 percent and increase inflation by 2.1 percent. On the other hand, under low oil prices the output loss from decontrol would be only 0.1 percent and inflation would increase 0.4 percent.

Under the high oil price scenario, with complete decontrol, the deficit would be reduced by $7.0 billion in fiscal year 1984 relative to NGPA. After 1984, the change in the deficits would be minor, resulting in a cumulative $8.2 billion reduction in the deficit over fiscal years 1984 to 1987. Under the low oil price scenario, the budgetary picture would not improve as much as the fiscal year 1984 deficit declined by $1.4 billion and the cumulative deficit from 1984 to 1987 declined by $2.0 billion.

Under the high oil price scenario and complete decontrol, the reductions in real gross domestic product and natural gas demand would be substantially larger than those presented above for the NGPA base case. On the other hand, the results for the low oil price scenario indicate very small macroeconomic adjustment costs with the complete decontrol option. These sensitivity results strongly suggest that the condition of world oil markets should be a primary consideration in any future debate concerning natural gas decontrol. If oil prices continue to be soft through 1984, then complete decontrol would entail very small macroeconomic adjustment costs and a slight decrease in budget deficit. Complete decontrol combined with high oil prices, however, would lead to stagflation.

Partial Decontrol in 1984

The sensitivity of the major economic variables and budgetary effects resulting from partial decontrol is presented in Table 16. The partial decontrol option with higher oil prices would result in a 0.2 percent decline in output and a 0.9 percent increase in prices in 1984. As expected, the reductions in natural gas demand would also be larger than under the base oil price scenario. The net budgetary effect in 1984 would be a $2.8 billion reduction in the deficit. The cumulative effect would be a $0.2 billion dollar increase in the budget deficit over fiscal years 1984-1987.

TABLE 15. SENSITIVITY OF OUTPUT, INFLATION, NATURAL GAS DEMAND, AND NET BUDGETARY EFFECT TO OIL PRICE CHANGES UNDER COMPLETE DECONTROL IN 1984; CHANGES FROM THE NGPA BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Low Oil Price Scenario				
Real Gross Domestic Product (GDP) (percent change)	-0.10	0.03	0.04	0.03
GDP Price Deflator (percent point change)	0.40	-0.20	0.00	0.00
Natural Gas Demand (percent change)	-0.70	-0.20	0.40	0.50
Net Budgetary Effect [a] (by fiscal year, changes in billions of nominal dollars)	1.40	0.20	0.10	0.30
High Oil Price Scenario				
Real Gross Domestic Product (GDP) (percent change)	-0.60	-0.04	0.07	0.03
GDP Price Deflator (percent point change)	2.10	-0.94	0.02	0.02
Natural Gas Demand (percent change)	-5.00	-3.70	-2.93	-2.81
Net Budgetary Effect [a] (by fiscal year, changes in billions of nominal dollars)	7.00	0.90	-0.20	0.50

a. Positive numbers indicate a reduction in the deficit; negative numbers indicate an increase.

TABLE 16. SENSITIVITY OF OUTPUT, INFLATION, NATURAL GAS DEMAND, AND NET BUDGETARY EFFECT TO OIL PRICE CHANGES UNDER PARTIAL DECONTROL IN 1984; CHANGES FROM THE NGPA BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Low Oil Price Scenario				
Real Gross Domestic Product (GDP) (percent change)	-0.02	0.02	0.02	0.02
GDP Price Deflator (percent point change)	0.10	-0.10	0.00	0.00
Natural Gas Demand (percent change)	-0.10	0.20	0.20	0.30
Net Budgetary Effect [a] (by fiscal year, changes in billions of nominal dollars)	0.40	0.00	0.00	0.10
High Oil Price Scenario				
Real Gross Domestic Product (GDP) (percent change)	-0.20	0.12	0.07	0.03
GDP Price Deflator (percent point change)	0.90	-0.80	-0.02	-0.02
Natural Gas Demand (percent change)	-2.40	-0.80	-0.30	-0.20
Net Budgetary Effect [a] (by fiscal year, changes in billions of nominal dollars)	2.80	-1.15	-1.24	-0.64

a. Positive numbers indicate a reduction in the deficit; negative numbers indicate an increase.

The effects of partial decontrol under the low oil price scenario would be insignificant. For example, the 1984 reduction in real gross domestic product would be 0.02 percent. The fiscal year 1984 deficit would decrease by $0.4 billion. The cumulative change in net budgetary balance would be less than a $1 billion dollar reduction in the deficit. The range of macroeconomic adjustment costs presented here provides more evidence to underscore the importance of oil prices. Nevertheless, the budgetary effects vary within a fairly narrow range under this option.

CHAPTER IV. SENSITIVITY OF DECONTROL EFFECTS TO FISCAL AND MONETARY POLICY ASSUMPTIONS

The analysis to this point has assumed a completely accommodative monetary policy and maintenance of a real level for federal discretionary spending. This chapter examines the budgetary implications of decontrol assuming a tighter fiscal policy that would erode real federal discretionary spending and a more restrictive monetary policy that would result in higher interest rates. These new assumptions would increase the budgetary savings of complete decontrol from $3.6 billion to $4.6 billion in fiscal year 1984. In 1985, complete decontrol under these more restrictive policy assumptions would lead to a $1.8 billion increase in the 1985 fiscal year deficit compared to a $0.7 billion reduction under the base assumptions. Under these new assumptions, partial decontrol in 1984 would reduce the deficit by $1.4 billion during fiscal years 1984 and 1985, as opposed to the $0.6 billion reduction estimated under base assumptions. Thus, restrictive fiscal and monetary policies would not substantially change any net budgetary savings that could be realized from the decontrol of wellhead natural gas prices.

This chapter presents the key assumptions used to formulate the more restrictive fiscal and monetary policy assumptions and discusses the macroeconomic and budgetary implications of complete and partial decontrol under these alternative policy assumptions.

FORMULATION OF THE ALTERNATIVE FISCAL AND MONETARY POLICY ASSUMPTIONS

Under the tighter fiscal policy assumed in this chapter, defense and nondefense discretionary spending would not be allowed to rise to offset inflation and maintain real levels. This policy assumption would have two effects on the budget. The first is direct and obvious--reduced outlays. The second effect is indirect and would lead to lower tax revenues since reduced government spending tends to reduce income and output in the general economy. Thus, the reduction in discretionary outlays might be partially offset by lower tax revenues.

The macroeconomic and budgetary effects of decontrol would depend on the response of monetary policy. In the period of economic adjustment to deregulation, the policy governing the available supply of money would be critical because of the relationship between gas prices and the demand for money.

If gas prices rose and prices for other goods failed to fall rapidly enough, then the level of prices for all goods in general would rise. In response to such an increase in the general price level, consumers might increase their demand for money rather than reduce their spending on other goods and services. If consumers increased their demand for money in this fashion, then the relevant question would be: would the Federal Reserve Board allow the money supply to grow to meet this demand?

According to traditional macroeconomic models, if the Federal Reserve Board held money aggregates constant, then higher interest rates would result. This would reduce economic growth and increase unemployment in the short term.

On the other hand, the Federal Reserve might accommodate the price increase by expanding the supply of money and avoiding the adverse economic effects of higher interest rates, but at the cost of higher inflation. There is considerable debate over this view, however. Some economists claim that more rapid money growth would lead to an increase in interest rates rather than averting it. This would occur if investors perceived a more rapid growth in money as a precursor to higher inflation. While this view may be correct, it has not been quantified in models that are available for the problems under investigation here.

In fact, most major macroeconomic models give sometimes conflicting results for alternative money growth scenarios. In many cases, these models must be "adjusted" in order to provide reasonable estimates for the sensitivity of macroeconomic variables to monetary policies. This study assumes that interest rates would rise or fall in direct proportion to the change in the demand for money. In other words, if higher prices caused the demand for money to increase by one percentage point and if the Federal Reserve Board reacted by reducing the money supply by an equal amount, then interest rates would increase by one percentage point. This assumption reflects the "traditional" perspective of monetary policy's effects described above. This method is based on model simulation results obtained from a separate study and represents a middle ground between results obtained from two major macroeconomic models. [1] Since the inflationary effects of

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1. The interest rate sensitivity to money growth used in this study is an average of the implied elasticities from the DRI and Wharton model simulations completed for "Three Large Scale Model Simulations of Four Money Growth Scenarios," a staff study for the Subcommittee on Monetary and Fiscal Policy of the Joint Economic Committee (September 1982).

decontrol would die out after two years, this analysis does not attempt to measure these effects on the long-term structure of interest rates.

In previous chapters, an accommodative monetary policy was assumed for the NGPA base case and the decontrol options. Thus, as was the case when oil prices were varied in Chapter III, new monetary policy assumptions must be incorporated into these scenarios. Table 17 shows the resulting interest rate changes. The nonaccommodative monetary policy combined with the partial deregulation of gas prices under NGPA in 1985 would cause interest rates to rise five-tenths of a percentage point over those rates in that year under the completely accommodative monetary policy assumed in the previous base. This new NGPA base, therefore, is the point of reference in this chapter. Since complete decontrol in 1984 would cause prices and money demand to increase, a nonaccommodating monetary policy would lead to a 1.1 percentage point increase in interest rates. In 1985, interest rates under complete decontrol would be lower than the original NGPA base case, however, since the inflationary effect of higher gas prices would already be subsiding. Interest rates under partial decontrol with tight money would exhibit a similar pattern except that the changes would not be as large, reflecting the smaller macroeconomic effects of this option.

COMPLETE DECONTROL IN 1984

Table 18 presents the macroeconomic and energy demand effects of complete decontrol in 1984 under the new monetary and fiscal policy assumptions. In general, these alternative policy assumptions would exacerbate the short-term macroeconomic adjustment costs associated with decontrol. For example, the first year reduction in real gross domestic product (GDP) output would be 0.6 percent, rather than the 0.3 percent estimated under the base assumptions used in Chapter II (see Table 3). In addition, the adjustment costs would be prolonged as real GDP declined by 0.5 percent in 1985, primarily because of the lagged effects of higher interest rates on purchases of consumer and producer durable goods. This is in sharp contrast to the slight gain in real domestic output found under complete decontrol using the base assumptions of Chapter II.

While the first year inflationary effects of decontrol would be no different under these new assumptions, they would be somewhat lower in 1985 since lower output growth in 1984 would reduce aggregate demand and, therefore, ameliorate inflation. The reductions in natural gas consumption would be substantially larger than under the base assumptions because the level of economic activity would be lower. In conclusion, a tight monetary policy combined with declining real discretionary spending would increase the macroeconomic adjustment costs of complete decontrol.

TABLE 17. INTEREST RATE CHANGES FOR THREE DECONTROL OPTIONS, ASSUMING A NONACCOMMODATIVE MONETARY POLICY; CHANGES FROM THE ORIGINAL NGPA BASE CASE (By calendar year)

Option	1984	1985	1986a	1987a
NGPA	0.0	0.5	0.0	0.0
Complete Decontrol	1.1	-0.4	0.0	0.0
Partial Decontrol	0.4	-0.3	0.0	0.0

a. The inflationary effects of higher gas prices die out after two years.

TABLE 18. MACROECONOMIC AND ENERGY DEMAND EFFECTS OF COMPLETE NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND NO INCREASE IN FEDERAL DISCRETIONARY SPENDING; CHANGES FROM THE NEW NGPA BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Real Gross Domestic Product GDP (percent change)	-0.6	-0.5	0.2	0.0
Inflation (rate of change)				
GDP deflator	1.1	-0.5	0.0	0.0
Consumer Price Index	1.0	-0.4	0.0	0.0
Unemployment Rate	0.2	0.1	-0.2	0.0
Natural Gas Consumption (percent change)	-2.5	-2.4	-1.1	-1.2
Oil Imports (percent change)	0.3	-0.1	0.4	0.2

The net budgetary effects of complete decontrol with these new assumptions are presented in Table 19. In the first year under complete decontrol, the deficit would be reduced by $4.6 billion, rather than the $3.6 billion under the base assumptions. In fiscal year 1985, the deficit would increase by nearly $2 billion, as savings in discretionary spending were offset by a greater loss in tax revenues, resulting from decreased economic activity (caused by less government spending and higher interest rates). After 1985, the deficit would be reduced, primarily as a result of faster economic growth as the economy finally adjusted to higher gas prices. The cumulative change in the deficit for fiscal years 1984-1987 would be a reduction of $7.7 billion, $2.7 billion more than the deficit reduction estimated under the base assumptions.

TABLE 19. NET BUDGETARY EFFECTS OF COMPLETE NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND GOVERNMENT DISCRETIONARY SPENDING UNADJUSTED FOR INFLATION; CHANGES FROM THE NEW NGPA BASE CASE (By fiscal year, in billions of nominal dollars)

Budget Component	1984	1985	1986	1987
Revenues				
Individual income taxes	2.8	-0.5	3.1	2.9
Corporate income taxes (nonmining)	-0.6	0.4	0.4	0.1
Federal excise taxes	0.1	0.0	0.1	0.1
Social insurance taxes	1.4	0.0	0.6	1.3
Corporate income taxes (mining)	1.1	0.5	0.6	0.6
Total revenues	4.8	0.4	4.8	5.0
Outlays				
Benefit payments for individuals	1.2	2.7	2.8	3.3
Natural gas royalties (offsetting receipts)	-1.0	-0.5	-0.6	-0.6
Total outlays	0.2	2.2	2.2	2.7
Net Budgetary Effect [a]	4.6	-1.8	2.6	2.3

a. Positive numbers indicate a reduction in the deficit; negative numbers indicate an increase.

PARTIAL DECONTROL IN 1984

The effects of partial decontrol on prices, output and energy demand are presented in Table 20. Again, the output losses during 1984 and 1985 would be larger than those found under the base assumptions. As with these assumptions, however, output gains in the out years would offset the short-term losses. While natural gas consumption would be 1.0 and 0.5 percent lower in 1984 and 1985, respectively, they would increase slightly in 1986 as economic growth moved upward. In conclusion, since partial decontrol would involve relatively small increases in gas prices, its effects seem to be immune to any deleterious effects emanating from restrictive monetary or fiscal policies.

The budgetary effects of partial decontrol appear in Table 21. The fiscal year 1984 reduction in the deficit under the base assumptions was $1.1 billion (see Table 6), whereas the reduction would be $1.4 billion under the new assumptions. The deficit would not be changed in 1985, but deficit

TABLE 20. MACROECONOMIC AND ENERGY DEMAND EFFECTS OF COMPLETE NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND FEDERAL DISCRETIONARY SPENDING UNADJUSTED FOR INFLATION; CHANGES FROM THE NEW NGPA BASE CASE (By calendar year)

Variable	1984	1985	1986	1987
Real Gross Domestic Product (percent change)	-0.2	-0.1	0.3	0.1
Inflation (rate of change)				
GDP deflator	0.4	-0.4	0.0	0.0
Consumer Price Index	0.3	-0.4	0.0	0.0
Unemployment Rate	0.1	0.0	-0.1	0.0
Natural Gas Consumption (percent change)	-1.0	-0.5	0.1	0.0
Oil Imports (percent change)	0.2	0.1	0.5	0.2

reductions in the out years would yield a cumulative net deficit reduction of roughly $3.7 billion over fiscal years 1984-1987. The magnitude of these numbers indicates that the net budgetary consequences of partial and complete decontrol are insignificant, particularly in light of larger projected deficits for fiscal years 1984 and 1985.

TABLE 21. NET BUDGETARY EFFECTS OF PARTIAL NATURAL GAS DECONTROL IN 1984, ASSUMING A NONACCOMMODATIVE MONETARY POLICY AND FEDERAL DISCRETIONARY SPENDING UNADJUSTED FOR INFLATION; CHANGES FROM THE NEW NGPA BASE CASE (By fiscal year, in billions of nominal dollars)

Budget Component	1984	1985	1986	1987
Revenues				
Individual income taxes	0.9	-0.7	1.4	0.6
Corporate income taxes (nonmining)	-0.2	0.4	0.3	0.0
Federal excise taxes	0.0	0.0	0.1	0.0
Social insurance taxes	0.5	-0.4	0.2	0.4
Corporate income taxes (mining)	0.3	0.0	0.0	0.0
Total revenues	1.5	-0.7	2.0	1.0
Outlays				
Benefit payments for individuals	0.4	0.7	0.3	0.4
Natural gas royalties (offsetting receipts)	-0.3	0.0	0.0	0.0
Total outlays	0.1	0.7	0.3	0.4
Net Budgetary Effect [a]	1.4	0.0	1.7	0.6

a. Positive numbers indicate a reduction in the deficit.

APPENDIXES

APPENDIX A. NATURAL GAS REGULATORY HISTORY AND CONTRACT PROVISIONS

The budgetary effects of natural gas decontrol primarily depend on the resulting level of natural gas prices. The economy's response to higher gas prices under decontrol ultimately changes budget revenues and outlays. Thus, the first step in estimating the budgtary implications of higher gas prices is to understand the process by which the gas market would reach a new price level upon decontrol. This process involves a sequence of transactions between natural gas producers, pipelines, utilities, and final users that are governed by a variety of contract provisions not commonly found in other markets. These transactions and contract provisions are affected both directly and indirectly by federal and state natural gas regulatory policies. Consequently, this appendix provides background information on the regulatory history of the natural gas market, the Natural Gas Policy Act of 1978 and producer/purchaser contracts.

THE EVOLUTION OF NATURAL GAS POLICY

Natural gas regulation was established with the enactment of the Natural Gas Act of 1938 (NGA). Judicial interpretation of the NGA determined the format of subsequent federal gas regulation and the types of problems that would eventually arise under it. Knowledge of the history of federal regulation under NGA is, therefore, a necessary first step in understanding current natural gas policy issues.

The Natural Gas Act of 1938

The justification for federal intervention in the natural gas market was based on a series of Federal Trade Commission (FTC) reports that documented numerous abuses, including monopoly control over prices by pipelines in the gas market. As a result, the FTC recommended federal regulation of interstate natural gas prices. Natural gas bills were introduced in the Congress each year from 1935 to 1937, generally as proposals to regulate interstate pipelines in the same fashion as electric utilties. A bill was finally approved by the Congress and signed into law by President Roosevelt as the Natural Gas Act of 1938.

The NGA was designed to deal with pipeline monopoly in order to protect consumer interests. The act introduced the use of price ceilings for the resale of interstate gas from pipelines to consumers. These prices were calculated according to the traditional public utility method, in which prices were set to cover actual costs plus a reasonable rate of return and depreciation.

Federal Regulation Under the NGA

The Federal Power Commission (FPC), which administered the NGA, first focused its attention on the regulation of pipelines. The scope of NGA, however, was expanded in 1954 with the Supreme Court's decision in Phillips versus Wisconsin. The Court interpreted the NGA as requiring the FPC to regulate rates charged by natural gas producers and pipelines in the sale of interstate gas. Thus, the FPC was given the authority to regulate natural gas producers' wellhead prices.

Initially, the FPC attempted to set wellhead prices for producers on an individual basis. This procedure required the commission to study the rate base and operating costs of each producer in order to calculate individual cost-based prices and led to a huge backlog of cases. As a result, the FPC set producer prices for entire geographic regions based on regional average production costs and allowed rates of return. The Supreme Court upheld the concept of area-wide pricing in the Permian Basin Area Rate Case of 1968.

Recognizing a growing imbalance between natural gas supply and demand, the FPC attempted to increase price incentives for gas production. In 1974, it set a national price for gas from wells drilled on or after January 1, 1973. In addition to allowing a higher price, the FPC included an annual price escalator and excluded certain state and federal taxes and allowances from the calculation of wellhead prices.

The FPC also recognized that the interstate-intrastate market distinction had become a problem. The regulated interstate market price did not provide adequate incentive to draw supplies from the unregulated intrastate market in which prices were higher. Furthermore, interstate demand remained artificially high because the price of new, high-cost gas was averaged with old gas prices. Thus, the average price paid by consumers did not reflect the full marginal cost of new gas supplies. This disparity between intrastate and interstate demand led to gas shortages in the interstate markets during the middle 1970s. This, in turn, led the Congress to reconsider natural gas policy.

The Natural Gas Policy Act of 1978

The Natural Gas Policy Act (NGPA) of 1978 was intended to provide incentives for new production through higher prices while preventing sharp price increases for gas already in production. Consequently, the act combined deregulation and price controls by allowing phased deregulation of certain categories of newly discovered gas and by creating nationwide price ceilings for all other gas. Also, the Federal Energy Regulatory Commission (FERC) was established to replace the Federal Power Commission.

An overview of NGPA is presented in Table A-1. As the table illustrates, the sections of NGPA can be classified into three major categories: supply incentives, consumer protection, and regulation of intrastate gas prices.

The supply incentive sections were designed to increase the nation's gas supply at the margin by allowing price increases that were rapid by historical standards and eventual deregulation. Section 102 includes gas found outside 2.5 miles of an existing well or gas found 1,000 feet below the completion depth of that well. In addition, Section 102 includes gas from outer continental shelf leases and production from new reservoirs. The price ceilings for these categories are allowed to increase at the rate of inflation plus a real growth premium. New onshore gas produced within existing fields is included in Section 103; its price increases at only the inflation rate. High-cost gas (Section 107--that is, gas that is costly to produce) includes gas from wells drilled below 15,000 feet, and gas produced from geopressurized brine, coal seams, devonian shales, and other high-cost sources. With the exception of gas produced from low-production wells (stripper wells), each of the supply incentive categories would be deregulated on January 1, 1985.

The NGPA was also designed to protect consumer interests through continued regulation of most gas already in production. Hence, the second major category of gas under NGPA includes old, low-cost natural gas. Section 104 sets the ceiling price for natural gas already dedicated to interstate commerce. The maximum lawful price in contracts that are renegotiated is determined by the provisions set forth in Section 106 of NGPA. The Section 106a price is the higher of either the price in the expiring contract or $0.54 per milion Btus, both escalating at the annual rate of inflation. Section 109 is a catch-all category. Each of these categories would not be deregulated in 1985.

The last major part of NGPA addressed the disparities between intrastate and interstate gas prices by imposing price controls on intrastate gas. For Section 105 gas, the price ceilings are tied to new gas prices

TABLE A-1. OVERVIEW OF THE NATURAL GAS POLICY ACT OF 1978

Sections	Description	Price Escalation Formula	Status as of 1/1/85
Supply Incentives			
102	New natural gas outside existing fields; new reservoirs; new outer continental shelf fields	Inflation plus real growth premium	Deregulated
103	New onshore wells within existing fields	Inflation	Deregulated
107	High-cost gas	Deregulated immediately	Deregulated
108	Stripper wells	Same as 102	Regulated
Consumer Protection			
104	Interstate gas	Same as 103	Regulated
106a	Renegotiated interstate contracts	Same as 103	Regulated
109	All other gas	Same as 103	Regulated
Intrastate Market			
105	Intrastate gas	Tied to new gas prices	Deregulated
106b	Renegotiated intrastate contracts	Same as 103	Deregulated if contract price is greater than $1.00 per thousand cubic feet

(Section 102). Section 106b includes provisions for setting renegotiated intrastate prices that closely follow the methods employed in Section 106a. Some intrastate gas categories would be deregulated in 1985.

AN OVERVIEW OF CONTRACT PROVISIONS

This section provides additional information on contracts between gas producers and purchasers. The delivery of natural gas from the producer to the final user involves a large and complex network of pipelines. Each step of this process has been regulated by both federal and state regulatory authorities. In fact, under most suggested wellhead decontrol policies, including those considered in this study, the regulatory apparatus for the transmission and distribution of gas would remain in place. Therefore, the adaptability of these regulations and their influence on contract provisions, particularly those affecting producer-pipeline transactions, would be an important consideration in developing a policy to decontrol natural gas.

Contract Provisions

The sales contracts between producers and purchasers generally include four major components: duration, take-or-pay provisions, pricing provisions, and buyer-protection clauses. The following sections explain the nature of each of these provisions and present estimates of their prevalence in the natural gas market.

Contract Duration. Long-term contracts are often arranged in order to guarantee continued service and to justify capital investments in either gas turbines or pipelines. Contracts in the interstate market were historically written for 20 years or more. Long-term contracts also exist in the major intrastate markets, such as Texas and Louisiana. Recent contracts are for shorter time periods, reflecting producers' fears of being locked into fixed prices during inflationary periods. Thus, while the gas market is beginning to acquire more flexibility, the existence of long-term contracts will delay the adjustment of the gas market to new gas pricing policies.

Take-or-Pay Provisions. Take-or-pay provisions require the buyer to pay for certain quantities of gas at preset prices regardless of whether delivery occurs at the time of payment. The financial uncertainty associated with gas production is a major motivation for this provision. Because of the large cash investments required to drill and develop a well, producers often need payment for large amounts of gas during the first few years of a contract. These requirements lead producers to seek an assured market for their gas, though contracts tied to the production from a specific well or a

particular field. Take-or-pay provisions are also sought by producers for protection against situations in which pipelines or other buyers could exert a disproportionate influence on prices and quantities sold once gathering equipment is in place.

Take-or-pay provisions may discourage buyers from minimizing the cost of gas. For example, a distribution company or pipeline may be forced to buy gas at a high price under a contract with a high take-or-pay provision and subsequently refuse cheaper gas or gas with a lower take-or-pay provision from another source. This phenomenon is partly attributable to the fact that profits by distribution and pipeline companies are regulated and, therefore, not influenced by any competitive bidding for gas supplies. Profits may be influenced, however, by any load loss. This problem is exacerbated since distribution companies purchase gas from pipelines at a single rate that is an average of old, low-cost gas and new, high-cost gas. Thus, this average cost pricing reduces the marketing risk associated with the purchase of high-cost gas to the extent that large volumes of low-cost gas are available.

Pricing Provisions. The pricing clauses in natural gas contracts are complex. There are three basic varieties of pricing provisions: definite escalation, highest allowed regulated-rate, and deregulation provisions. Definite escalation clauses set the price according to a fixed rate of growth or to a schedule of price increases in nominal or real dollars.

The latter two provisions set prices according to future external events, and are called indefinite escalator clauses. The highest allowed regulated-rate provision allows the producer the highest rate set by federal and state price regulations. Determining the overall price adjustments stemming from contracts that have this provision is difficult because of the uncertainty of regulatory actions. In addition, existing contracts reflect past responses to and expectations of federal and state regulation. For example, area rate clauses for both intrastate and interstate gas appeared after the adoption of area-wide, cost-based price regulation. The regulations changed again in 1974 when the Federal Power Commission adopted nationwide regulation. As a result of this change, and with the myriad of price ceilings under NGPA, the highest allowed regulated-rate provisions were written in even more general terms. Many recent contracts set prices according to the highest price allowed under current law.

Deregulation provisions are included in contracts to determine the price of gas when it is deregulated and to set the price of gas not currently regulated (such as high-cost gas under Section 107 of the NGPA). Ever since the Phillips decision in 1954, deregulation has been anticipated. Therefore, deregulation clauses were added to contracts. The most common deregulation provision sets the contract price at an average of the two or three

highest prices being paid in a producing area. The price may also be the highest paid by the purchaser for similar gas sold under another contract. These options are called "most-favored-nation" clauses. Producers with contracts containing these clauses would receive preferential treatment upon deregulation over other producers who do not have such contracts.

Many recent contracts have several pricing options in the event of deregulation. Besides the most-favored-nation clauses, natural gas prices have been tied to the price of oil, usually that of crude oil or No. 2 fuel oil (distillate oil). Pricing clauses may also be based on a fixed percentage rate of increase. When more than one pricing option appears in a contract, the seller is usually allowed to choose the price. Another form of seller protection provided in some recent contracts is the minimum-price provision that prevents the price from falling below its previous level. The combination of this provision and the most-favored-nation clauses could lead to a situation in which prices could increase sharply yet could not easily be adjusted downward in response to market forces.

Buyer Protection Provisions. While some price provisions favor high gas prices, buyer-protection clauses introduce some flexibility into the marketing of natural gas. The "market-out" and "if-disallowed" provisions are two major types of buyer-protection clauses. A market-out provision allows the buyer to refuse delivery if the gas is determined to be unmarketable at the renegotiated price. In many contracts, the conditions for determining marketability are not clearly defined. Some contracts, however, leave the determination of marketability to the discretion of the buyer. The if-disallowed provision would not allow a new price to be passed through to the buyer if the FERC or a state public utility commission determined that the price was unjustified.

Effects of Contract Provisions on Gas Supplies

This section presents estimates of the relative importance of various contract provisions on total natural gas supplies. Several surveys of existing contract provisions have recently been conducted to estimate the magnitude of the "fly-up" problem--that is, the possibility that wellhead natural gas prices will increase sharply upon decontrol and not fall in response to market forces because of rigid contract provisions.[1] The key data requirement is the amount of gas associated with each type of contract provision.

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1. The data presented in this section are from U.S. Department of Energy, Energy Information Administration, Office of Oil and Gas, Natural Gas Producer/Purchaser Contracts and Their Potential Impacts on the Natural Gas Market (June 1982).

For example, there may be a large percentage of contracts with deregulation provisions that have most-favored-nation clauses; yet if these contracts cover only a small faction of total gas supplies, then the fly-up problem may not occur.

The prevalence of take-or-pay provisions and buyer-protection clauses is also important. For instance, if contracts with maximum-price provisions also include market-out clauses, then there would be a greater possibility that prices could fall in response to market forces. On the other hand, widespread use of take-or-pay provisions would have the opposite effect. Another important aspect is contract age. Contracts signed after passage of the NGPA have different provisions. In addition, contracts governing interstate and intrastate gas also vary because of fundamental differences in the two markets and in their regulatory histories. These distinctions imply that the following discussion can best be divided into contract provisions for old interstate gas (NGPA Sections 104 and 106a), old intrastate gas (Sections 105 and 106b), and post-NGPA gas (Sections 102, 103, 107 and 108).

Old Interstate Gas. In 1980, the volume of interstate gas under contracts signed before enactment of the NGPA was estimated to be 6.18 trillion cubic feet (approximately 31 percent of total U.S. demand), with an average wellhead price of $0.89 per thousand cubic feet. About 8 percent of this amount is governed by contracts with definite price escalators, 26 percent is covered by highest allowed regulated rate clauses, and 66 percent has deregulation provisions. Roughly 92 percent of old interstate gas supplies have take-or-pay provisions. Only 6 percent have market-out clauses, and 14 percent have renegotiated prices that can be disallowed by FERC. For the contract volumes covered by deregulation clauses, 90 percent have most-favored-nation clauses that link the price to an average of the highest priced gas in specific producing areas. Thus, based on this information, there appears to be little downward flexibility in prices for old interstate gas.

Old Intrastate Gas. The volume of old intrastate gas (Sections 105 and 106b) has been estimated at 6.23 trillion cubic feet in 1980 (approximately 32 percent of U.S. demand). The average wellhead price for this gas in 1980 was about $1.17 per thousand cubic feet. On January 1, 1985, only Section 105 gas with a price that exceeds $1.00 per million Btus would be deregulated. Rollover contracts for intrastate gas (that is, contracts that expire and are extended) are included in Section 106b. Natural gas produced under Section 106b would be deregulated in 1985 if the price exceeds $1.00 per million Btus. Roughly 28 percent of the gas volumes under Section 105 will roll over between now and 1985.

It is estimated 'hat 34 percent of intrastate gas under Sections 105 and 106b will be deregulated in 1985. Of this amount, 51 percent have only definite price escalator provisions. This is in sharp contrast to the 8 percent figure for old interstate gas and may reflect the fact that three-fourths of Section 105 gas is delivered under contracts signed before 1973. In addition, direct sales to final users, primarily large industrial customers, take a much larger proportion of intrastate sales. The large share of definite price escalator clauses may have been used to attract these customers. Twenty-two percent of the old intrastate gas supplies slated for decontrol in 1985 has most-favored-nation clauses. Close to 76 percent has take-or-pay provisions. Thus, prices for old intrastate gas may not increase as sharply as those for old interstate gas.

Post-NGPA Gas. Some overlap exists between contracts signed before and after the Natural Gas Policy Act of 1978. For instance, some long-term contracts have been amended to add additional wells. Consequently, a contract negotiated before enactment of the NGPA can apply to a well drilled after 1978. Recognizing this possible double counting problem, the 1980 volume of post-NGPA gas has been estimated at 6.23 trillion cubic feet (approximately 33 percent of total demand). The 1980 wellhead price for this gas was $2.19 per thousand cubic feet, considerably higher than prices for the two previously mentioned categories.

Deregulation clauses cover 59 percent of post-NGPA gas. Of these contract quantities, 76 percent have most-favored-nation clauses, 21 percent have market-out clauses, and 21 percent have oil parity price provisions. Roughly 80 percent of post-NGPA gas volumes are associated with contracts that have take-or-pay provisions. The price of post-NGPA gas, therefore, will quickly reflect any change in gas pricing policy.

APPENDIX B. MEASURING THE MACROECONOMIC AND BUDGETARY ADJUSTMENTS TO GAS PRICES

This appendix presents a brief overview of the major economic mechanisms governing the adjustment of the economy and the budget to higher gas prices. Four mechanisms related to interactions between the economy and energy market are discussed:

- Shifts in the composition of consumer spending in response to relative price changes and reductions in discretionary income resulting from higher gas prices;
- Substitutions among inputs used in the production of nonenergy goods and services (such as labor demand and the demand for fuels);
- Energy producer investments in equipment and structures in response to higher energy revenues; and
- Inflationary implications of higher energy prices given the above three mechanisms and current wage and price flexibility.

The major elements involved in the calculation of federal revenues and outlays are also discussed.

ADJUSTMENTS IN CONSUMER SPENDING

The allocation of total consumer spending would be affected by an increase in real natural gas prices. Given the historically observed inelastic nature of short-run energy demand, a rapid rise in natural gas prices would increase the share of energy expenditures in total consumer outlays. Since it is unlikely that household income would increase as rapidly as these expenditures, either savings or consumption of other goods and services would decline in the short run.

These shifts in the composition of consumption would affect employment and output. A reduction in consumption of other goods and services caused by higher energy prices would translate into lower receipts, output, and employment for various sectors of the economy.

ADJUSTMENTS IN PRODUCTION

Nonenergy producers purchase fuels from energy producers, hire workers, and invest in capital to produce goods for final consumption or for inputs into another production process. The payments for these factors of production become household wage and capital income and energy producer revenues. Nonenergy producers would play an important role in the adjustment of the economy to higher gas prices.

The production response to higher gas prices is a combination of substitution effects and the rate at which output is adjusted in response to demand effects stemming from changes in the composition of consumer spending. Substitution effects embody "own-price" and "cross-price" effects. The former is the simple law of demand--less of any good or input is typically demanded as its price rises. Cross-price effects reflect the substitutability and complementarity among factors of production. For example, if natural gas and labor are substitutes, then the quantity of labor demanded would increase with a rise in natural gas prices. On the other hand, if they are complements, the quantity of labor demanded would decline with an increase in the price of natural gas. These relationships would determine changes in labor and capital income in response to higher gas prices.

ENERGY PRODUCERS

The consumption and investment behavior of energy producers would be pivotal in the economic adjustments set in motion by decontrol. If natural gas producers received prices in excess of the costs of production, they would reap profits. These profits might be invested or distributed through dividends. Thus, as these profits resulted in higher income for households, they would offset the changes in consumer spending. For example, increased exploration, development, and production would increase employment in the energy industry. This employment stimulus and its associated impact on wage income would partially offset employment declines elsewhere in the economy and, as a result, stimulate growth in personal income.

This study assumes that natural gas production is determined by the quantity of natural gas demanded by households, commerce, and industry. Therefore, higher revenues for natural gas producers would stimulate their investment spending, but would not significantly affect the amount of gas actually produced. Higher natural gas prices would stimulate additions to proven reserves. The net effect on reserves, however, would be small since additions to natural gas reserves would probably not exceed current production. In addition, even if there were large increases in proven reserves

through enhanced recovery and more exploration, a corresponding increase in actual production might not occur. Producers might simply cap wells and wait for higher prices, especially if expectations were formed on the basis of declining domestic reserves and higher prices for marginal supplies, such as Canadian gas and liquified natural gas from Algeria.

PRICE AND WAGE FLEXIBILITY

The degree of price and wage flexibility under various natural gas policies would influence real income and output in the economy. The response of wages and prices to higher natural gas prices would probably be similar to the one associated with higher oil prices. An increasing share of natural gas expenditures in total consumer purchases and production costs would cause future natural gas price increases to have successively larger effects on the general price level. The current sensitivity of the general price level to oil prices is a case in point. One mitigating factor to this process of "price-ratcheting" is the demand response. In other words, if the reduction in natural gas demand caused by higher prices was large enough, its share in total costs might decline over time and, thus, offset the price-ratcheting effect.

The total impact of higher natural gas prices on the level of wages and prices is composed of direct and indirect effects. First, higher gas prices would directly increase the Consumer Price Index (CPI) and also increase producer prices. If nonenergy producers and households conducted economic transactions in a competitive environment with flexible prices, then higher natural gas prices might not substantially raise the price level. On the other hand, if most producers engaged in cost-markup pricing, then higher natural gas costs would be passed on to the next stage of production. The result would be higher producer prices. These higher prices would indirectly increase the CPI. A higher CPI would lead to somewhat larger wage and salary increases that would, in turn, add to production costs.

LINKS TO THE FEDERAL BUDGET

The budgetary implications of various natural gas policies are directly related to macroeconomic adjustments. Since tax revenues are extremely sensitive to changes in economic activity, special consideration is given in this report to the calculation of tax revenues in order to measure the unique changes that energy prices have on the economy and the tax base. Changes in federal outlays are not as directly intertwined with economic activity and, as a result, can be estimated based on budgetary rules of thumb.

Revenues

Various natural gas prices change personal income tax payments, corporate taxes, social insurance taxes, royalties, and other excise taxes. In this analysis, estimates of personal income tax payments are based on a set of equations that explicitly models individual income tax liabilities based on variations in the nominal/real composition of aggregate income.[1] In other words, the model estimates the impacts of new returns as well as the effects of increases in taxable income per return that are associated with inflation or real growth. This technique is most valuable for this analysis since higher energy prices tend to increase inflation and reduce employment simultaneously in the short term. This procedure also considers how aggregate taxable income is spread over the structure of tax brackets. Thus, the increase in tax revenues caused by bracket creep can be measured. The use of traditional tax models would tend to underestimate the increase in tax revenues from bracket creep.

Changes in corporate profits and excise taxes are linked to the production side of the econometric model. Higher energy prices promote a different mix of labor and capital used by nonenergy producers and, as a result, influence corporate income. Thus, changes in corporate tax payments in response to higher energy prices primarily depend on substitution possibilities among fuels and other inputs used in the production of goods and services. Corporate taxes paid by the mining sector are primarily dependent on fuel prices and the level of energy demand.

Social insurance tax payments (for example, Social Security and unemployment compensation) are also computed in the model, based on total wage and salary income in relation to the maximum contribution limit and on the unemployment rate. These payments would increase from purely nominal growth in wages and salaries caused by inflation and from increases in unemployment filings, both resulting from higher gas prices.

Finally, royalty payments by natural gas producers would also increase under decontrol since these payments are based on a percentage of wellhead receipts. Production from offshore wells is the major source of federal natural gas royalty receipts. Roughly 24 percent of all gas is produced from offshore federal lands and is taxed at a rate of 16 and two-thirds percent. Production from onshore wells on federal lands is approximately 5 and one-half percent of total production and is taxed at a 14 percent rate. About 50 percent of total onshore royalties accrue to state governments.

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1. Congressional Budget Office, Modeling the Indexed Income Tax (March 1982).

Outlays

The response of federal outlays to natural gas decontrol would depend on the resulting inflation and unemployment rates. Changes in federal purchases of goods and services induced by gas policy are based on the rate of change in the gross domestic product price deflator. The remaining change in government outlays includes changes in unemployment compensation; programs automatically indexed to the Consumer Price Index, such as Social Security; and indirectly indexed programs, such as Medicare.

A budgetary rule-of-thumb procedure is used to calculate outlays in this report because the econometric approach adopted for the other parts of the analysis does not adequately portray the program-specific timing of outlays on federal grants and transfers. For example, Social Security benefits are adjusted every July, based on the most recent first-quarter-to-first-quarter increase in the CPI. On the other hand, federal retirement benefits are adjusted in the spring based on the December-over-December CPI increase. In addition, some outlays tend to respond to changes in the inflation rate even though they are not explicitly indexed. Medicare and Medicaid are two such programs. Unemployment insurance benefits also increase with inflation since wage rates increase. Given these complications, a set of program-specific multipliers were used to calculate the change in federal grants and benefit payments to individuals for percentage changes in the unemployment rate and the CPI.